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ABSTRACT

The project report that introduces this document describes how the Partnership for Academic and Career Education (PACE) project developed tech prep/associate degree program agreements between Tri-County Technical College and seven school districts in Anderson, Oconee, and Pikens Counties, South Carolina. The partnership resulted in restructuring of secondary curriculum options, development of seamless pathways into postsecondary programs, implementation of guidance and other support activities, enhancement of postsecondary curricula, and more high school graduates pursuing postsecondary education at the community college level. Extensive appendixes include the following: (1) sample curriculum materials, such as teacher's guides for Introduction to Technologies, Mathematics for the Workplace, and Communications for the Workplace; (2) materials explaining tech prep options in four-year colleges; (3) graphic representations of the program development model; (4) summary of new and/or enhanced course offerings by district; (5) guide listing desired competencies for each tech prep mathematics, English, and science course; (6) sample tech prep student and parent advisory guides; (7) curriculum pathways; (8) description of Technical Advanced Study procedures; (9) newspaper article; (10) guide to area business speakers; (11) career awareness brochure; (12) career planning flowchart; (13) Technical Advanced Placement faculty and staff handbook and student handbook; and (14) four electromechanical units. (YLB)

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ED 361 523

Grantee Organization:
Tri-County Technical College
P.O. Box 587
Pendleton, SC 29670

Grant Number: G008730448

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Starting Date: October 1, 1987
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Number of Months: 36

Project Director:
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(803) 646-8361, ext. 2378

FIPSE Program Officer: (Dr. David B. Arnold)

Grant Award:

Year 1	$ 71,230
Year 2	$ 69,059
Year 3	$ 69,115
TOTAL	$209,404

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FIPSE Program Officer:	(Dr. David B. Arnold)
Grant Award:	Year 1 $ 71,230 Year 2 $ 69,059 Year 3 $ 69,115 TOTAL $209,404

II. PROJECT SUMMARY/ABSTRACT

The purpose of the Partnership for Academic and Career Education (PACE) project was to develop "2+2/Tech-Prep/Associate Degree" programs between Tri-County Technical College and seven school districts in Anderson, Oconee and Pickens counties of South Carolina. The project sought to develop a more rigorous, focused curriculum for the "neglected majority"--general education students receiving inadequate high school preparation for work or postsecondary education. Early problems with the project design resulted in an expanded program definition and a modified approach to program development which was more responsive to the diverse needs of area school districts. Results include restructuring of secondary curriculum options, development of seamless pathways into postsecondary programs, implementation of guidance and other support activities, enhancement of postsecondary curricula and greater numbers of high school graduates pursuing postsecondary education at the community college level.

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Titles of Project Reports and Products

- -Curriculum Competency Listings
- -Introduction to Technologies Course Syllabus And Support Materials
- -Materials Showing Blended Academic and Vocational Pathways Linking Secondary and Postsecondary Curricula
- -Secondary/Postsecondary Articulation Handbooks (Student and College)
- -Career Planning Flowchart for Students
- -Newsletters
- -Guide to Area Business Speakers: Resource for Teachers and Counselors
- -Summer Institute Curriculum for Teachers and Counselors
- -PACE Model for Tech Prep Program Development
- -Eleven Modules for Math, Physics and English Courses Using Applications from Local Industries
- -Organizational Materials for Establishing Business/Public School/Community College Partnerships
- -Curriculum Planning and Implementation Materials
- -Curriculum Advising Guides
- -Technologies Career Brochure for Students
- -Marketing and Promotional Materials
- -Dual Enrollment Guidelines
- -Descriptive Materials for Industry-Sponsored College Tuition Assistance Programs
- -Project Highlights in Tech Prep-Associate Degree: A Win/Win Experience (Hull and Parnell, forthcoming early 1991)

III. EXECUTIVE SUMMARY

PROJECT TITLE: "The Partnership for Academic and Career Education"

GRANTEE:
Tri-County Technical College
P.O. Box 587
Pendleton, SC 29670

PROJECT DIRECTOR: Diana M. Walter (803-646-8361, ext. 2378)

A. Project Overview. The problems addressed by this project were: 1) the dropout rate in area high schools; 2) the high enrollment of students in general education programs receiving inadequate preparation for either postsecondary education or the world of work, 3) the low number of students pursuing postsecondary education at the associate degree level following graduation, and 4) the need to remediate over half of all graduates entering local community college programs.

The project's service area is Anderson, Oconee and Pickens counties of South Carolina, a predominantly rural area in the northwestern corner of the state, with approximately 13,500 students enrolled in seven school districts, sixteen high schools and four regional career centers. The region is served by Tri-County Technical College, a comprehensive community college founded in 1962 with approximately 2900 students enrolled i diploma, certificate and associate degree programs. The region's adult population is significantly under-educated and economically disadvantaged.

B. Purpose. The project sought to address identified problems by developing "2+2/Tech-Prep/Associate Degree" programs as described in The Neglected Majority (Parnell, 1985). These coordinated, sequenced curricula in four career-cluster areas would link grades 11 and 12 with the first two years of related college study providing a more rigorous and focused curricula than either of the existing vocational or general education options open to non-baccalaureate bound students.

C. Background and Origins. To facilitate the development of these programs between the seven area school districts and Tri-County Technical College, a business/education partnership called PACE--Partnership for Academic and Career Education--was established just prior to the first year of the project. The original objectives were to develop applied math, English and science courses, supported by general technology courses in industrial/engineering technology, business, health and public service clusters. The use of applications in academic courses would serve to increase content relevancy motivating students to achieve higher skills.

D. Project Descriptions. At the end of year one, several problems with the original project design became evident and as a result, a number of corrective actions were taken. The focus was changed to begin enhanced coursework in the ninth grade, the curriculum plan was modified from a four-cluster approach to a generic option involving applications from all clusters and, to relieve concerns of duplication with the proposed general technology courses, existing vocational offerings were incorporated into the concept as the mechanism for providing technology skills. A simple program definition was also adopted--"Tech Prep links high school and two-year college programs eliminating 'gaps' and 'overlaps' to provide academic and vocational preparation for mid-level technology careers in industrial/engineering technology, health, business and public service fields." This definition helped explain one of the basic project goals--to provide a "seamless" pathway between secondary and postsecondary education.

Rather than working with selected pilot schools, as originally planned, an individualized development approach was adopted. Each district was encouraged to name a coordinator, formulate a planning team and consider project staff as "district employees." Staff then helped school officials take the basic program concept and adapt it to meet the districts' unique needs, interests and resources. Instead of using committees to coordinate curriculum issues, all decisions related to curriculum and support components were made in accordance with each district's normal policies and procedures. The new approach to curriculum development involved adapting existing courses to fit the program concept, adding new applied-academic courses and incorporating locally-developed modules into the program. An introductory course for the curriculum was designed and an articulation process was implemented to reduce overlapping between the exit points of the high school curriculum and the entry points of College programs.

A series of activities and materials were also developed to support emerging Tech Prep programs. A Counseling Committee was formed, Tech Prep advising guides were written, materials explaining mid-level technology careers were collected or developed locally and disseminated to all area schools. To help explain the importance of the Tech Prep concept and its relationship to workforce needs, area business professionals participated routinely in inservice activities and in a classroom speakers' project.

E. Project Results. The most significant project outcomes have been: 1) curriculum changes and restructuring of curriculum options, 2) development of blended academic/vocational pathways, 3) attitudinal changes, and 4) increased student enrollment into postsecondary programs.

Because of the diversity of area school districts and because of the individualized approach used for program development, considerable variation exists in the level of program implementation. However, all seven districts have implemented one or more new, applied-academic courses during the project period and have participated in local curriculum development activities, hosted inservice sessions, and have been involved actively in the articulation components of the project. All districts have developed, or are completing development of Tech Prep curriculum pathways--a blending of academic and vocational study leading into postsecondary occupational degree programs with the opportunity for advanced standing. The development of these pathways, published in the form of Tech Prep Advising Guides, is a crucial step in moving from isolated course offerings to a coordinated Tech Prep curriculum.

Three high schools in two districts have made unprecedented changes by restructuring their curriculum options from College Prep, General and Vocational to College Prep (four-year college bound) and Tech Prep (two-year college bound). This is an outcome beyond the original expectations of this project. Three additional districts are now considering similar restructuring efforts.

Another outcome has been a change in the guidance counseling function. Previously, counselors have been oriented to helping students become admitted to postsecondary institutions. But because technical colleges in South Carolina are open-door institutions, admission is not the real issue. As a result of this project, guidance staff are changing their orientation from admissions counseling to "positioning"-- helping students position themselves to take advantage of post-high school opportunities such as advanced standing, industry-sponsored tuition assistance programs and beginning college study with the necessary academic foundation. Guidance counselors as well as other school personnel have shown growing support for a community college/Tech Prep option and many have changed their attitudes toward the capability of non-baccalaureate bound students to reach higher academic standards.

The project has significantly impacted Tri-County Technical College in terms of enrollment growth, changes in advising and admissions counseling, student tracking/transcript program revisions and faculty/staff involvement in curriculum development, articulation and support activities. During the final project year, College faculty realized that the program concept could be enhanced by enabling Tech Prep students to graduate as "advanced technicians." Special certificate programs are being developed to enhance students' marketability and enable them to graduate with two postsecondary credentials in the time it would normally take to complete an associate degree.

The project has resulted in several spin-off activities including the development of a new component called "Technical Advanced Study" enabling selected high school seniors to take Tri-County Technical College courses. Seven students completed ten courses during the fall quarter of 1990 and all are continuing coursework in the winter term. Spin-off activities involving the business community include an active speakers' bureau project, career materials development, and new industry-sponsored tuition assistance opportunities for Tech Prep students.

F. Summary and Conclusions. The outcomes of this project have generated much enthusiasm locally and have created heavy demands for dissemination regionally and nationally. The PACE project was recently selected as a model program by the South Carolina Board for Technical and Comprehensive Education and, as a result, efforts are now underway to replicate the project throughout South Carolina.

Continuation of the project has been assured through adequate local funding and the approach used to integrate Tech Prep curricula into area schools. FIPSE support has enabled the development of a solid foundation and, as a result, additional work is now possible in areas such as teacher training, expanded guidance for non-baccalaureate bound students and developing stronger links between the school/community/home environments to more effectively encourage achievement of the "Neglected Majority." Project staff anticipate that responding to these needs and others will result in continued success in meeting the needs of students and the community.

IV. BODY OF REPORT

A. PROJECT OVERVIEW

The PACE project began in response to concerns of business and education leaders in Anderson, Oconee and Pickens Counties of South Carolina that too many students were dropping out of area high schools or graduating without adequate preparation for postsecondary education or employment. To address these concerns, the project involved establishing a business/education partnership to coordinate the development of "2+2/Tech-Prep/Associate Degree" programs between seven area school districts and the region's community college. The target population for these new, more rigorous and focused programs were general education students, the majority of the public school population, who had historically been most likely to drop out of school or fail to continue their education after graduation.

After correcting early problems with the project design, effective implementation has resulted in such outcomes as curriculum changes and restructuring of secondary curriculum options, development of blended academic and vocational pathways linking secondary and postsecondary programs, attitudinal changes and increases in enrollment of high school graduates into community college programs. Several spin-off and support activities have resulted in other outcomes enabling a comprehensive approach to improve the educational achievement of the target population.

B. PURPOSE

The problems addressed by this project were: (1) the high rate of dropouts in Anderson, Oconee and Pickens County high schools; (2) the high enrollment of public school students in general education programs receiving inadequate preparation for either postsecondary education or the world of work; (3) the low number of high school students pursuing postsecondary education at the associate degree level following high school graduation; (4) the need to remediate over half of all high school graduates entering Tri-County Technical College (TCTC) occupational degree programs; and (5) the need for greater numbers of College graduates to meet growing demands of area employers.

The project sought to address these problems by developing "2+2/Tech-Prep/Associate Degree" programs as described in The Neglected Majority (Parnell, 1985), a new publication at the time which was generating much enthusiasm among community college leaders. These coordinated, sequenced curricula in allied health, business, industrial/engineering technology and public service cluster areas, would link grades 11 and 12 with the first two years of related college study. Students choosing the "2+2/Tech-Prep/Associate Degree" program in high school over the traditional general education option would have a greater propensity to graduate from high school, to pursue postsecondary education at the associate degree level and would possess the necessary entry-level skills to begin college study without remediation.

C. BACKGROUND AND ORIGINS

1. **Description of the Area.** The service area of this project is Anderson, Oconee and Pickens counties of South Carolina, a predominantly rural area in the northwestern corner of the state. The tri-county region involves seven school districts comprised of 16 high schools and four regional career centers enrolling approximately 13,500 students (1989-90 enrollment). The region is served by Tri-County Technical College, a comprehensive community college founded in 1962 with approximately 2900 students enrolled in diploma, certificate and associate degree programs during the 1990 fall term.

Anderson County has five school districts and two vocational/career centers. Anderson School District One involves two high schools and shares an area career center with Anderson School District Two, a single high school district. Both districts are in rural areas. Anderson District Three is a small, extremely rural district with no access to a career center although vocational courses are offered through the district's high school. Anderson District Four is also rural, although less so than District Three, and has one high school with some vocational offerings. Anderson District Five is predominantly urban with three high schools, one of which also serves as the district's career center. The Pickens County School District is comprised of four predominantly rural high schools and a career center. One of the Pickens County high schools serves a large percentage of children whose parents are employees of Clemson University. The Oconee County School district involves four rural high schools (one of which is in an isolated mountain region which serves students in grades 6-12) and also has a regional career center. The school districts of Oconee and Pickens County have also recently established alternative high schools for at-risk students.

The region's adult population is significantly under-educated (e.g., nearly half of adults in Pickens County have not completed high school) and economically disadvantaged. The region comprises 50% of the federally-designated Appalachian region of South Carolina.

2. **Project Beginnings.** Several months prior to the beginning of this project, area business and education leaders formed a partnership to facilitate the development of "2+2/Tech-Prep/Associate Degree" programs between the seven school districts of Anderson, Oconee and Pickens counties and Tri-County Technical College. This partnership organization, called PACE (Partnership for Academic and Career Education), was formally established in May of 1987 when members of a Coordinating Board were named. The original PACE partners included the ACCTion Consortium (which ceased operation in December of 1988), the seven area school districts, the National Dropout Prevention Center at Clemson University, several area manufacturing industries and Tri-County Technical College. Top-level administrators from each agency served as Board members with one of the area superintendents serving as chairman of the PACE Coordinating Board.

During the time the PACE partnership was being formed (1986-87), the

College provided support by releasing a staff member half-time to coordinate activities and complete work on a FIPSE proposal. When the PACE partnership was established and the FIPSE grant was awarded, this staff member, Mrs. Carol M. Anderson, became the executive director for PACE and the FIPSE project director. During the first year of the project (1987-88), a full-time associate director/curriculum developer and a secretary (administrative assistant) were hired. Hiring a qualified associate director/curriculum developer proved to be more difficult than anticipated and took until mid-way through the first project year to complete.

Much of the work during year one centered on establishing the working structure, identifying two pilot schools (one to develop the "2+2/Tech-Prep/Associate Degree" program in the industrial/engineering cluster and one to develop the business cluster program), and starting public relations and promotion activities. In addition to the PACE Board, a Curriculum Oversight Committee was established to coordinate all curriculum development activities associated with the project. The Curriculum Oversight Committee was comprised of district-level curriculum coordinators, vocational directors and College academic administrators. The committee was chaired by an area assistant superintendent of instruction.

The original project objectives for "2+2/Tech-Prep/Associate Degree" programs were to develop applied math, English and science courses, supported by general technology courses in each of the four cluster areas (industrial/engineering technology, health, business and public service). The intention of 2+2 program development was to design programs that would be more rigorous and more focused than either of the existing options open to non-baccalaureate bound students (i.e., general or vocational education programs which comprise up to 75% of the total high school enrollment). Students would study academic subjects using applications from their cluster area of interest and would simultaneously develop a basic understanding of related technology concepts in newly-designed foundation courses. For example, students in the industrial/engineering technology (I/ET) cluster would take math, English and science courses with I/ET applications along with introductory courses exposing them to general I/ET concepts.

The original target population of this project was students enrolled in general education programs within area public schools. Using 1989-90 enrollment figures and national percentage breakdowns for enrollment in the various tracks (CORD, 1985), this would represent fifty percent or about 6750 students in the tri-county area Of the remaining fifty percent, 3375 or 25% would be enrolled in vocational programs and the remaining 25% enrolled in college prep programs.

3. **Problems Encountered.** At the end of the first year, the project director elected to take advantage of newly-established State incentives for early retirement and resigned from Tri-County Technical College. The author and current project director took over at the beginning of the project's second year (1988-89). After

several weeks of study and interviewing school, project and College personnel, the author concluded that while some progress was evident, several problems were impeding the rate of progress needed to meet the stated objectives. A visit from the FIPSE program officer, Dr. David B. Arnold, in January of 1989 provided the necessary forum to discuss problems and formulate a new direction.

A summary of problems encountered during year one as well as those discussed during the meeting with Dr. Arnold is included below.

a. School personnel felt there were conceptual and financial problems associated with the original "2+2/Tech-Prep/Associate Degree" concept:

--Beginning the program in grade 11 was virtually useless as a dropout prevention strategy as the propensity for dropping out is established long before grade 11 (even if students cannot legally act on their wishes to leave school, they have in effect dropped out "attitudinally").

--Starting more academically advanced courses in grade 11 would be ineffective unless students' skills were being raised sequentially in earlier grades.

--Starting an applied approach to teaching academic content in grade 11 might be too abrupt a change for students exposed only to traditional teaching methods throughout earlier grades.

--Splitting the old general "track" into four new, cluster-oriented tracks, no matter how appealing for students, would cause serious financial and scheduling problems (especially for smaller districts).

--The development of new technology courses in the four clusters would inevitably result in some overlapping with existing vocational education courses (for which the districts had already invested considerable resources).

--There was great concern from directors of area vocational programs that the "2+2/Tech Prep/Associate Degree" program was competition as both would be recruiting from the same pool of general education students.

b. The approach to curriculum development was not working as originally envisioned:

--The concept of having a committee of district and College faculty coordinating curriculum development was incompatible with the way school districts work (each district prefers to make its own decisions about factors affecting curriculum, rather than follow the recommendations of a committee).

--During the project period, professionally-developed applied courses became available which made local curriculum development in several subject areas unnecessary.

--The two pilot schools selected for the project were part of multi-high school districts which had both experienced recent changes in superintendents. As a result, officials at both districts were uncomfortable with the idea of targeting single high schools for program development.

c. There was some concern on the part of College faculty teaching diploma and certificate programs that they had been left out of the "2+2/Tech-Prep/Associate Degree" game plan. These faculty felt that if their programs were part of the College's offerings, then they should be important enough for high school students to prepare for:

--The project director became concerned that limiting the program to preparation for associate degree programs only was becoming an issue on campus and that students needed the freedom to choose among all the College's postsecondary options.

d. There was growing evidence that a Tech Prep curriculum, no matter how stimulating, would not be successful without the development of a number of support activities:

--Most of the early project effort had been geared toward curriculum development activities without much emphasis on counseling and guidance components; as a result, project staff began to notice an interesting phenomenon--school personnel were comfortable with the benefits of baccalaureate-level preparation for careers but were much less comfortable (and familiar) with the benefits of a two-year college education. Before counselors could, in good conscience, recommend a Tech Prep option, they needed specific information on the types of careers students would be preparing for, the salaries and advancement opportunities that could be expected, etc.

--Project staff came to realize that the best way to promote the Tech Prep concept and related careers was through the area business community. Business professionals had the power and credibility to help sell the program but mechanisms for channeling their input needed to be developed.

--Parents also needed information and guidance to support and encourage their children's involvement in Tech Prep.

D. PROJECT DESCRIPTION: REVISED APPROACH

In order to achieve the original project objectives, and to correct identified problems in the initial approach, several changes were made beginning in January of 1989.

1. Program Definition. The definition and focus of the program was changed to begin in the 9th grade and end with the completion of a postsecondary certificate, diploma or associate degree. The name was subsequently changed from "2+2/Tech-Prep/Associate Degree" to "Tech Prep--PREParation for TECHnologies." The focus became preparing students for careers in mid-level technologies (defined as careers requiring one to two years of postsecondary study

for entry and/or advancement).

The curriculum concept was revised to include a sequential building of academic skills throughout grades 9-12 using applications from all four cluster areas. This would enable a "generic" Tech Prep curriculum where students could be exposed to different career applications and, as a result, develop a broader understanding of career options. (Incorporating applications from different clusters was also the approach used in the professionally-developed applied academic courses that became available after the project began.)

To resolve the serious problems associated with existing vocational education programs (i.e., competition for enrollment, duplication of course content), vocational courses were incorporated into the revised Tech Prep concept. Vocational courses became the mechanism to build a "technology skills base" starting as early as grade 9.

A simple definition for the program was adopted--"Tech Prep links high school and two-year college programs eliminating 'gaps' and 'overlaps' to provide academic and vocational preparation for mid-level technology careers in industrial/engineering technology, business, health and public service fields." This definition helped explain to administrators, teachers, parents and students one of the basic goals of this project--to provide a "seamless" pathway between the secondary and postsecondary levels of education.

Shortly after the program focus began changing, principals and faculty in area middle and junior high schools started to feel they had a role to play in Tech Prep. Their concern was that students would be less likely to choose a Tech Prep option in high school if they had not been "oriented" properly in earlier grades. Project staff, in cooperation with district and school personnel, started developing a role for middle/junior high schools by emphasizing career understanding in grades 6-8 related to occupations targeted by the Tech Prep concept. (Project staff have since come to see this role for middle and junior high schools as a vital component to the success of any Tech Prep program.)

2. **Implementation.** The project staff changed the focus from working with selected pilot schools to working with all districts using an individualized approach. Staff encouraged each district to name a coordinator, formulate a planning team and consider project staff as "district employees." To make this change truly effective, project staff had to actively learn more about each district including the factors that made the district unique, any other initiatives that could impact on Tech Prep development and the district's unique strengths that could be particularly helpful in supporting Tech Prep development. Staff had to identify and adapt to the communication and working style preferences of each district and develop skills as true team players. For example, because development work of this magnitude requires honest communication, staff had to understand which issues should not be communicated outside the district/school and take measures to maintain an effective level of trust and confidentiality.

Staff then helped each district take the basic program concept and adapt it to meet the unique needs, interests and resources of the district. All decision-making related to curriculum and support components remained where it belonged--in accordance with the district's normal policies and procedures. PACE committees became mechanisms for communication and sharing of concerns and successful practices.

3. Curriculum Development. The project director and curriculum developer identified a practical, cost-effective approach to curriculum development. First, existing courses were identified that already fit the Tech Prep concept, or that could be enhanced to fit the concept. Second, staff became "brokers" of information on the new applied academic courses developed by the Center for Occupational Research and Development (CORD), the Agency for Instructional Technology (AIT) and the S.C. Department of Education. As brokers, staff developed considerable expertise in all areas related to these courses. Project staff shared examination materials, helped school officials with information on securing state grants for course materials, linked schools that had implemented the courses with those that planned to offer them and assisted school personnel to fit the new courses into a Tech Prep curriculum plan.

Third, the project's curriculum developer began designing curriculum modules to enhance all Tech Prep math, English and science courses. The development process began with teams of College faculty from academic and technical areas and high school faculty who helped critique and refine the products. More recently, the development teams have expanded to include industry representatives who now supply most of the applications used in the course materials.

Applications used in Tech Prep courses serve to enhance students' motivation for learning academic concepts (i.e., increasing the relevancy of academic coursework to the "real world"), provide students with greater understanding of mid-level technology careers, help students learn more about the industries and jobs available in their own communities, encourage greater interaction between students and their parents concerning classroom and career issues, and facilitate the blending of academic and vocational study.

Because the program was re-focused to include existing vocational courses as the "technology base" for Tech Prep, there was no need to develop generalized technology courses in the four cluster areas. However, project staff and PACE committees felt there was a need to develop an introductory course for the curriculum. After some initial research, the curriculum developer began designing an "Introduction to Technologies" course for high school freshmen. The course expands career awareness activities started at the middle school level, includes hands-on activities blending technology and academic concepts, builds self-esteem and academic support skills (time-management, stress management, study skills), and develops course/career planning skills for high school completion and beginning/financing college study.

In order to facilitate students' smooth transition from high school to college study, and to ensure there were no gaps or overlaps in students' competency levels, the College's entry-level skill requirements had to be considered in all curriculum development activities. A review and updating process was conducted for the College's over 200 entry-level courses. That information is used to upgrade exit competencies from the old general education program and to close "gaps" with entry-level College requirements. Listings of College course competencies and syllabi are used in the process to identify "overlapping."

The project suffered a set-back during the second project year when the curriculum developer resigned in March of 1989 to pursue other professional interests. The position was filled in mid-June of that year, just three months prior to the final year of the project. The development of the curriculum modules and the Introduction to Technologies course referenced above were completed during the third project year. Other curriculum materials were, however, developed in earlier years. A sample of curriculum materials developed throughout the project is included in **APPENDIX A.**)

Another problem was encountered at the end of the second project year when the administrative assistant resigned to take a promotion at Clemson University. The administrative assistant had been the only remaining staff person involved with the project from the beginning. A new administrative assistant was hired and assumed her duties on October 1, 1989.

4. Articulation. Articulation of equivalent high school and College courses was the mechanism used to reduce "overlapping" between the two levels of education. While the College had been involved in some articulation with area school districts prior to this project, these efforts had been only minimally successful. (One possible explanation is that, in earlier years, students with advanced standing in vocational areas often did not possess the academic skills needed to allow satisfactory progress in College programs. Consequently, these students were actually at a disadvantage when beginning college-level study which resulted in a lack of faculty and administrator enthusiasm for maintaining and expanding articulation agreements.

During the time that the project was being reorganized to resolve some of the early problems, the articulation process was also at a standstill. Shortly after the current project director took over, it became evident that the College policies had to be revised in order for the articulation process to continue. At that time, College policy required students to complete all admission procedures before being considered for advanced standing. A revision of the advanced standing policy was written and approved by the President's Council in March of 1989 which resolved the problems and allowed progress to continue.

5. Support Activities. One of the first changes made related to support activities was the formation of a Counseling Committee,

chaired by an area guidance director, comprised of middle/junior high, high school, career center and College counselors. This committee has since become one of the most active, supportive and enthusiastic of the PACE committees. Members have provided project staff with invaluable input on the types of activities needed to support a truly successful Tech Prep initiative.

In order to help facilitate the new emphasis on counseling and support activities, Tri-County Technical College released a staff member half-time in February of 1989 to serve as the PACE Counselor Liaison. This staff member, who also serves half-time as the College's Director of Cooperative Education, has a master's degree in counseling and has extensive contacts with area business and industry professionals. His involvement with various support activities has contributed significantly to the overall success of this project.

As a result of working individually with each district and the input received from the PACE committees, project staff began developing course planning and career understanding materials to support emerging Tech Prep programs. Course planning materials involved the development of "Tech Prep Guides" geared to each district's course offerings. The Guides were developed to explain Tech Prep and to list suggested courses (academic and vocational) organized around the original four career cluster areas. As each district implemented or revised courses in the curriculum, the Guides were modified accordingly.

Career understanding materials were identified, developed and/or modified by the project staff to help the districts "sell" their Tech Prep programs. One of the most effective strategies involved handouts and brochures using job ads from local papers collected by the project director. These ads helped show the diversity of careers, salaries, responsibilities and the necessity of post-secondary education. Other materials were provided by College faculty on the positions and salaries of recent Tri-County graduates. Some commercially-prepared materials were also obtained and loaned to area teachers and counselors. However, project staff quickly learned that there is a deficit of good, commerically-prepared materials on the market to adequately explain mid-level technology careers and the benefits of a two-year college education. The most effective materials to this point have been locally-developed or obtained from area industries.

One problem that surfaced in the project's second year was concern on the part of many parents (especially from the minority community) that Tech Prep would eliminate opportunities for their children to pursue a bachelor's degree. To overcome this problem, project staff worked with school/district officials in two ways: 1) by developing materials and transparencies for parent information sessions explaining the benefits of Tech Prep, and 2) by developing materials explaining options open to Tech Prep students who change their minds and decide to pursue baccalaureate-level education. (See **APPENDIX B** for a sample of this material.) Most information sessions for parents were conducted by district and/or school personnel with materials developed by project staff.

Project staff have designed graphic representations of the model used for program development and the various components of Anderson, Oconee and Pickens County Tech Prep programs. These descriptions are included in **APPENDIX C.**

6. Resources. There have been various sources of funds and support for this project. FIPSE funds have provided a critical base of support by funding half of the project director's salary, full salary for the curriculum developer (in year one and two and half in year three) and full salary for the project's administrative assistant. FIPSE has also provided funds for program and curriculum development, promotion and several project-related support activities. Tri-County Technical College has provided the remaining staff salaries including the half-time counselor liaison and has provided most, if not all, support for materials development including in-house printing and graphics design. In addition, the College purchased computer and office equipment to support project staff in year two of the grant. Numerous College faculty, staff and administrators have been involved in project activities for which the College has absorbed all indirect costs (i.e., no release-time funds for secondary or postsecondary staff were provided through the FIPSE grant).

School districts have also invested considerable resources in Tech Prep development. All secondary-level faculty, counselors and administrators involved in curriculum development, guidance materials design, orientation for students and parents, community presentations, etc. have done so with all costs being absorbed by the districts. Costs for professionally-developed course materials have been provided by state grants or absorbed by each district. Several representatives of area businesses and industries have also been involved with the project and have donated their time to assist with local curriculum development and/or to help project staff promote the program and related career opportunities.

E. PROJECT RESULTS

1. Descriptive Narrative. It should be noted that while area superintendents supported this project in the proposal stage, four of those seven superintendents left their positions for various reasons during the project period. The new superintendents became active supporters of the project but other key persons in each district and school had to be "sold" before any real progress could be made. And since the project staff have no decision-making authority in the schools, an individualized, district-owned approach to development had to be established in each of the seven districts. As school officials began to feel "ownership" of the program and to perceive project staff not as outsiders but as true members of their development teams, considerable progress was made in a relatively short period of time and creativity with the basic Tech Prep concept became evident.

Project staff have come to realize that this individualized, flexible approach to program development has both positive and negative consequences. On the positive side, the programs are being developed and implemented in ways that are realistic, cost-effective and integrated into each school's curriculum offerings. This helps ensure that Tech Prep is not an "add-on", but an integral component of secondary offerings (just like the college prep option). Conversely, the individualized development approach is very time-consuming and makes summative evaluation virtually impossible for the next several years.

a. Secondary-Level Results All seven districts have made considerable progress in Tech Prep development since the beginning of the project although some are further along in implementation than others. In three of the seven districts, it has taken three years to work through organizational changes, correct misconceptions left over from the original project design and establish a working structure conducive to program development. These difficulties have finally been overcome during the final project year and now all seven districts are moving toward meaningful, coordinated program development supported at both the district and school levels. (It should be noted, however, that while these districts were experiencing delays in establishing a viable working structure, progress was made in implementing new courses, participating in the articulation process, providing orientation for faculty/staff through inservice sessions on Tech Prep, enhancing staff and student awareness of mid-level technology careers and active involvement of district/school staff on all PACE committees.)

The most dramatic results of this project have been:

- curriculum changes,
- restructuring of curriculum options,
- development of blended academic/vocational pathways linking secondary and postsecondary offerings, and
- attitudinal changes on the part of administrators, teachers and counselors.

Again, because the school districts in the tri-county area are so diverse and because Tech Prep development is individualized by district, there is considerable variation in the level of program implementation.

Curriculum Changes.

All seven districts have implemented one or more new applied courses in math, science and English during the project period. Some districts have chosen to concentrate on one curriculum area at a time (such as English) for reasons that may involve resources, faculty availability/interest or scheduling limitations. Other districts have taken a more comprehensive approach and have developed all curriculum components simultaneously. A summary of new and/or enhanced course offerings by district is included in **APPENDIX D.**

In addition to implementing new, professionally-developed applied academic courses, all districts have participated in local curriculum development activities. Project staff, in cooperation with teams of high school teachers, College faculty and industry representatives, have developed seven curriculum modules used to enhance existing courses used in Tech Prep programs. Each district's assistant superintendent of instruction (or Tech Prep coordinator) decides how best to incorporate the modules into the curriculum. See **APPENDIX A** for copies of each module.

An introductory course for the Tech Prep curriculum ("Introduction to Technologies") has been developed by the project's curriculum developer with input from several area teachers. Project staff reported in the last FIPSE continuation proposal that the Introduction to Technologies course would be piloted in one school during the 1990-91 academic year. However, because the course has been received so enthusiastically, components are being pilot-tested in four sites during the 1990-91 school year. The Introduction to Technologies syllabus and supporting materials are included in **APPENDIX A.**

To facilitate curriculum planning, the curriculum developer has analyzed current course content at the secondary level, compared exit competencies from those courses to identified entry-level skills for College courses and developed a listing of desired competencies for each Tech Prep math, English and science course. This guide (see **APPENDIX E**) helps identify "gaps" between the two levels of education and continues to be a valuable resource for project staff in developing an effective Tech Prep curriculum.

Restructuring of Curriculum Options.

Anderson District Four and two of the four high schools in Oconee County have made unprecedented changes by restructuring their curriculum options from College Prep, General and Vocational to College Prep (four-year college bound) and Tech Prep (two-year college bound). This is an outcome beyond the original expectations of this project. Pickens County Schools, Anderson District Three and Anderson District Two are currently in initial planning stages for similar restructuring efforts.

As mentioned above, Pendleton High School (Anderson District Four) restructured its curriculum options beginning in the 1989-90 school year. They now have College Prep/Accelerated and Tech Prep options for nearly 700 students enrolled in grades 9-12. (Students not meeting State standards for basic academic skills are placed into special remedial programs not considered curriculum "options" for enrollment purposes.) Due in large part to the strong guidance coordination between the high school and the junior high school, fifty percent of current ninth graders registered last spring for the Tech Prep option for the 1990-91 school year.

Development of Curriculum Pathways.

Another result of the project has been the development of curriculum pathways--a blending of academic and vocational study leading into postsecondary occupational degree programs with the opportunity for advanced standing. It is the development of these pathways that moves a district from isolated course offerings into a coordinated Tech Prep curriculum. Tech Prep Advising Guides have been written and disseminated to faculty, staff and approximately 4300 students in three districts for the 1990-91 school year; guides are in draft form for two additional districts and will be completed by January, 1991 and guides are being planned currently for the remaining two districts. (See **APPENDIX F** for sample Tech Prep advising guides.)

The School District of Oconee County has developed a very comprehensive approach to the design of curriculum pathways for students in both the College Prep and Tech Prep options. Teams of academic and vocational faculty developed drafts of the pathways in 1990 and the project director is now working with school officials to transform the draft material into a handbook for students and parents. (See **APPENDIX G** for a sample of this material.)

Attitudinal Changes.

Perhaps the most exciting outcome of the project, and the most difficult to quantify, is the change in attitude on the part of administrators, teachers and counselors in area schools toward promoting a community college/Tech Prep option for students and toward the capability of non-baccalaureate bound students to reach higher academic standards.

In an attempt to identify some of these changes, project staff surveyed several staff members at the high school and junior high school in Anderson District Four during the month of September (1990). Among their written responses were the following observations:

a. "Students have been more motivated. They have experienced success and realized they were actually able to do algebra and physics in TP [Tech Prep] classes." (Guidance counselor, Pendleton High School)

b. "[Students'] overall attitude toward math improved because they saw a use for the material." (Math department head, Pendleton High School)

c. "The main change that I have seen is students (for the first time) believe that they have a worthwhile education option...Many teachers are recommending Tech Prep for their own children. Therefore, they are sincere when they make recommendations for other students." (Guidance counselor, Pendleton Junior High School)

d. "Improved self-esteem was another positive outcome of the [Principles of Technology] class. Some students in there felt that they were not bright enough to do too much science, such as physics...They feel good about accomplishing things that they had never thought to attempt. Two of the Tech Prep students are taking college prep physics this year." (Science teacher, Pendleton High School)

e. "The Tech Prep program has made teachers aware that we are in the business of educating all students to be productive citizens of society." (Principal, Pendleton High School)

Another outcome of the project is a change in the traditional guidance function of the public schools. For decades, counselors have been oriented to helping students become admitted to postsecondary institutions. But because technical colleges in South Carolina are open-door institutions, admission is not a problem. The problem is that students have not, historically, taken advantage of their school's offerings to avoid remediation in College programs, receive advanced standing, or become recipients of industry-sponsored tuition assistance programs. As a result of this project, counselors are changing their orientation from admission to "positioning"--helping students position themselves to take advantage of post-high school opportunities and avoid taking (and paying for) skills development they could have achieved in high school.

Two districts report that the project has improved the working relationship between academic and vocational faculty. In Anderson District Four and Oconee County, academic and vocational teachers now team-up to teach science and math concepts using applications from vocational classes. And in Anderson County, all Tech Prep English students now tour vocational classes and observe laboratory exercises. In Oconee County, teams of academic and vocational faculty planned out the new blended curriculum pathways for Tech Prep and College Prep students.

b. Spin-Off Results. There have been a number of spin-off activities related to this project. While none of these activities were directly funded through FIPSE, the results helped facilitate the comprehensive and successful implementation of the project.

As mentioned previously, the individualized approach to program development resulted in feelings of "ownership" and spawned creativity within several districts related to the Tech Prep concept. One example occurred during the third project year with McDuffie High School and Career Center's initiation of a new component called "Technical Advanced Study." This component allowed selected high school seniors to take Tri-County Technical College courses during the fall 1990 term. Seven students completed ten courses during the fall. All seven of the original students and an additional student are now enrolled in winter quarter courses. McDuffie and Anderson District Five officials are so enthusiastic about this new development that they are restructuring vocational offerings to begin in the tenth grade allowing more students to use their senior year as a "swing year" between high school and college. Two other districts are now in initial planning stages to add the Technical Advanced

Study (TAS) option to their Tech Prep programs. (See **APPENDIX H** for a description of TAS procedures.)

The business community has enthusiastically endorsed the Tech Prep concept (see **APPENDIX I**) and has actively supported program development in a variety of ways. In addition to being involved in curriculum development, eighty business professionals now participate in a speakers bureau to share their insights and expertise with area school personnel and students. The PACE Counselor Liaison coordinated the development of a Guide to Area Business Speakers (see **APPENDIX J**) which has been widely used during the third project year throughout the tri-county area. (This material also was incorporated into the support materials for the Introduction to Technologies syllabus.) Prior to the publication of the speakers guide, there was no mechanism to give teachers and counselors easy access to the expertise of area business professionals.

Three industries in Oconee County are now participating in a program to link Tech Prep and cooperative education at the secondary and postsecondary levels. Students participate in more rigorous academic courses, receive up to a year's worth of Tri-County Technical College credit for competencies gained in high school machining courses and maintain the same co-op position from high school through college. Local industries sponsor the students by paying College tuition, books and fees and also raise their co-op salaries upon entry to Tri-County's associate degree program in Machine Tool Technology. Eight other industries representing all three counties and one county in Georgia formed a consortium in September to expand these opportunities. The consortium plans to accept 20 students for the 1991-92 school year.

Three middle schools held career fairs during the third project year. While the career fair idea is not a new one, these fairs were different in that they highlighted mid-level technology careers providing students with an important orientation to Tech Prep. The five Anderson County school districts are planning a joint career fair for 1991. The PACE Counselor Liaison is working with planning team members to help include adequate representation of mid-level technology fields at this career fair which will be held at a local civic center.

The PACE staff offered three Summer Institutes for area teachers and counselors during the project period. A State Department of Education mini-grant enabled a part-time coordinator to be hired who planned sessions in close harmony with PACE, Tri-County Technical College and local industries. For the first time in the summer of 1990, there was a waiting list for acceptance into the course at the time of pre-registration. The Summer Institutes focus on employer needs, local employment trends, the Tech Prep curriculum, career counseling, strategies for classroom teachers in dropout prevention and other topics. Participants of the Institutes have rated their experience very highly and, as a result, have provided much positive word-of-mouth advertising for PACE and the Tech Prep initiative. (Many of the Institute participants were teachers newly assigned to

Tech Prep courses.)

Another spin-off activity was the development of a career awareness brochure. Project staff felt such a publication was needed based on feedback from PACE committees and the increasing interest of area counselors to help explain mid-level technology careers to students and parents. The design of the brochure was an activity of the PACE Counseling Committee during 1989-90 and was funded through a State Department of Education mini-grant. The brochure has been positively received in area schools. In August, project staff received a request from a newly-formed Tech Prep initiative in another part of the state to reprint the brochure for ten school districts. (A sample copy of the brochure is included in **APPENDIX K**.)

The School District of Pickens County began their Tech Prep program this fall by pilot-testing a new career exploration course at two sites. The project director is working with the District's Tech Prep Coordinator to refine this course into a "kick-off" course for the Tech Prep curriculum using the new Introduction to Technologies syllabus. As a final project, students will complete a Career Planning Flowchart designed jointly by the district coordinator and the project director. (See **APPENDIX L** for a sample copy of the flowchart.)

The guidance staff at Walhalla High School in Oconee County is in the process of redesigning the school's curriculum guide for 1991-92. Previously, the curriculum guide contained course descriptions and requirements for high school graduation. The new material will be a "career planning guide" emphasizing high school study as an important foundation for career at all levels. The guide will contain a modified version of the Career Planning Flowchart designed by Pickens County schools and will emphasize the concept of positioning rather than what's need to "get out" of high school.

c. PACE Organization Results. As the program concept evolved and as mechanisms began developing to channel input from area industries, the PACE organization has expanded. The PACE Coordinating Board now involves representatives from area companies reflecting all Tech Prep curriculum cluster areas (engineering/manufacturing, business, public service and health). During 1990, the executive director of the Anderson County Business & Education Partnership was named to the Board to help coordinate activities between this new partnership and the PACE organization. The founding Board chairman rotated off his position in May of 1989 and was succeeded by Mr. Roy H. Herron, superintendent of Anderson School District Three.

The two major PACE committees, the Counseling and Curriculum committees, remain active mechanisms for communication and networking. Beginning with the 1990-91 school year, both committees have included representatives from area industries. These new members bring a whole new dimension to planning, implementation and evaluation activities.

Prior to the FIPSE grant, all area vocational/career center directors met quarterly with the president and top administrators of Tri-County Technical College to discuss issues of mutual interest. Because discussion topics now revolve primarily around Tech Prep and related collaborative activities, the project director was named chairman of this group in 1990. The Vocational Directors Committee now functions as an important component of the PACE communication structure.

An interesting outcome of the PACE organization and committee structure is that the sharing of outcomes has facilitated a certain amount of "competition" and desire of schools to adapt and improve upon the products developed by others. Project staff have noticed repeatedly that this competition is healthy and results in improvements not only for individual districts but for the initiative as a whole. Often, products or processes developed by one district are absorbed into the activities of other districts.

In addition to district and school-level committees and planning teams, Tri-County Technical College also maintains an active, internal Tech Prep subcommittee. This committee is a subcommittee of the Instructional Affairs Committee and involves top-level academic and student services administrators. The purpose of the committee is to coordinate postsecondary components, identify impact areas and recommend appropriate actions.

d. **Postsecondary Level Results.** The PACE Tech Prep initiative has had major impact on Tri-County Technical College even though program development on the secondary level is a continuing and evolving process. The most noticeable impacts thus far have been in enrollment, advising, admissions, student tracking/transcript program revisions and in faculty/staff involvement in curriculum development and support activities. The project has also changed the ways in which the College communicates and interfaces with the public schools.

As mentioned previously, area school districts approach Tech Prep implementation differently. While one district may, for example, have started Tech Prep implementation by adding a new science course at the tenth grade level, another district may have chosen to implement changes in English offerings. And because most districts have chosen to raise skill levels sequentially across grades 9-12, the real impact on the postsecondary level may not be felt until current ninth graders enter College programs in the 1994-95 academic year. However, project staff and College administrators feel that the College's enrollment has already been effected just by the project's promotion of two-year college programs and related career opportunities. Graphs showing the project's impact on Tri-County Technical College's enrollment are included in section E-2 of this report.

College faculty and staff have been particularly impacted by the articulation process used to reduce overlapping between high school and College programs. The articulation process (called Technical Advanced Placement) is coordinated by College division chairmen and department heads. Project staff serve only as facilitators and provide some cross-divisional support. In addition to College policy changes, materials have been developed to help support advisor training, faculty have spent hours working with public school colleagues in developing and refining articulation agreements, handbooks and promotional materials for students have been developed and faculty have implemented a tracking system to evaluate the TAP process. Samples of materials developed are included in **APPENDIX M**. Detailed information on the results of Technical Advanced Placement for 1989 and 1990 is provided in section E-2 of this report.

Project staff have also worked closely with members of the College's Student Services Division to implement changes related to admitting incoming students with advanced standing, changing procedures related to the faculty advising system and modifying the College's computerized transcript program in order to reflect credit awarded through Technical Advanced Placement.

Most curriculum development activities associated with the project thus far have occurred at the secondary level. The reason for this is two-fold: 1) there is no justification to enhance entry-level College courses when Tech Prep seeks to close existing gaps between high school and College programs; and 2) the College must continue to offer entry-level occupational courses for adults who have not had the benefit of Tech Prep. The impact at the postsecondary level comes in scheduling when Tech Prep students enter with advanced standing and are ready to take occupational courses normally offered in later terms. Currently, three College programs (Machine Tool Technology, Office Systems Technology and Industrial Mechanics) have successfully resolved scheduling problems enabling Tech Prep students to enter and complete College programs in shorter time frames. Other programs are making individual adjustments in scheduling or allowing students to carry lighter loads in beginning College terms. These programs also provide activities to help students maintain skill levels while they are waiting to take the next course in the occupational sequence.

During the third project year, College faculty and academic administrators realized that the Tech Prep concept offered an opportunity not originally envisioned when the project began. By enhancing the exit point of associate degree programs, rather than the entry points, Tech Prep students would have the option of graduating with an "advanced technician" status. Currently, two advanced technology certificates are being developed in Machine Tool Technology and Office Systems Technology, programs where a year's worth of credit can be awarded through the Technical Advanced Placement component of Tech Prep programs. As the College's Dean of Instruction describes it, this opportunity resembles "graduate study for the associate degree." College transcripts will reflect completion of these certificates thereby notifying employers that applicants have completed advanced study in a particular technology area.

As mentioned previously, project staff have had difficulty locating sufficient material describing mid-level technology careers and have not had sufficient funds to purchase materials that are available (the majority of project time and funds have been devoted to curriculum development activities). To help alleviate this problem, Tri-County Technical College has expanded its Library collection of career materials and made these resources accessible to public school teachers, counselors and students. The College has added numerous new publications representing a wide variety of mid-level careers including some for which postsecondary training is available only through other area colleges.

Another outcome on the postsecondary level has been a noticeable increase in faculty interest and involvement in working with local schools. In addition to direct project-related activities such as Tech Prep curriculum development and articulation, College faculty have sought opportunities for other collaborative activities. For example, two Engineering Technology department heads wrote and received a grant from the Society of Manufacturing Engineers to develop four expanded units of the Principles of Technology course. Project staff were involved as advisors in this process which was completed at the end of the 1989-90 school year. Four electro-mechanical units were developed (see **APPENDIX N**) and disseminated to area schools along with specially built lab equipment provided by the College.

At the end of the third project year, College faculty from Welding, Industrial Mechanics, Industrial Electronics Technology and Textile Management Technology, began working with area vocational faculty in new collaborative projects. Three projects involve developing or enhancing secondary vocational curricula in related areas. Another project involves developing promotional material showing articulation pathways in Textile Manufacturing Technology from high school through Tri-County and into Clemson University's baccalaureate degree program.

2. Graphic Representations of Impact.

As previously indicated, this project has focused primarily on formative evaluation activities in response to an evolving development process. Evidence of the project's impact can be seen in the development of products, curriculum restructuring on the secondary level, growth in the College's enrollment, growth in the numbers of high school graduates pursuing postsecondary education at the community college level and student participation in the project's Technical Advanced Placement component. The last three impact areas will be discussed in this section of the report.

Baseline data are still being collected to assess the impact of the enhanced high school Tech Prep curriculum on the academic preparedness of students entering College programs. A summary of the data on 1988 high school graduates entering College programs was reported in the last FIPSE continuation proposal. The summary of 1989 high school graduates is unavailable at this time because the College's Director of Institutional Research, who assumed responsibility for this part of the analyses, has had to respond to reporting requirements issued in 1989 by the S.C. Commission on Higher Education. The data for the report is available through the College's database but has not yet been extracted and summarized.

General Growth in Selection of Postsecondary Education

One of the project's goals was to increase the numbers of high school graduates pursuing postsecondary education at the two-year college level. A comparison of the data shows a small increase in the percentage of high school students entering postsecondary education (see Figure 1) upon graduation from high school. Among those students entering postsecondary education, an increasing percentage are choosing to enter two-year colleges or institutions offering occupationally- oriented training (see Figure 2). While students' selection of two and four-year colleges remained fairly constant in 1987 and 1988, a sharp reversal occurred in 1989. During that year, the numbers of students entering two-year and other postsecondary institutions increased while the numbers of students entering four-year colleges decreased by a proportional amount. This may reflect a reaction to increasing tuition costs at area four-year colleges during that time causing more students to enter transfer programs at two-year colleges.

Growth in Enrollment at Tri-County Technical College

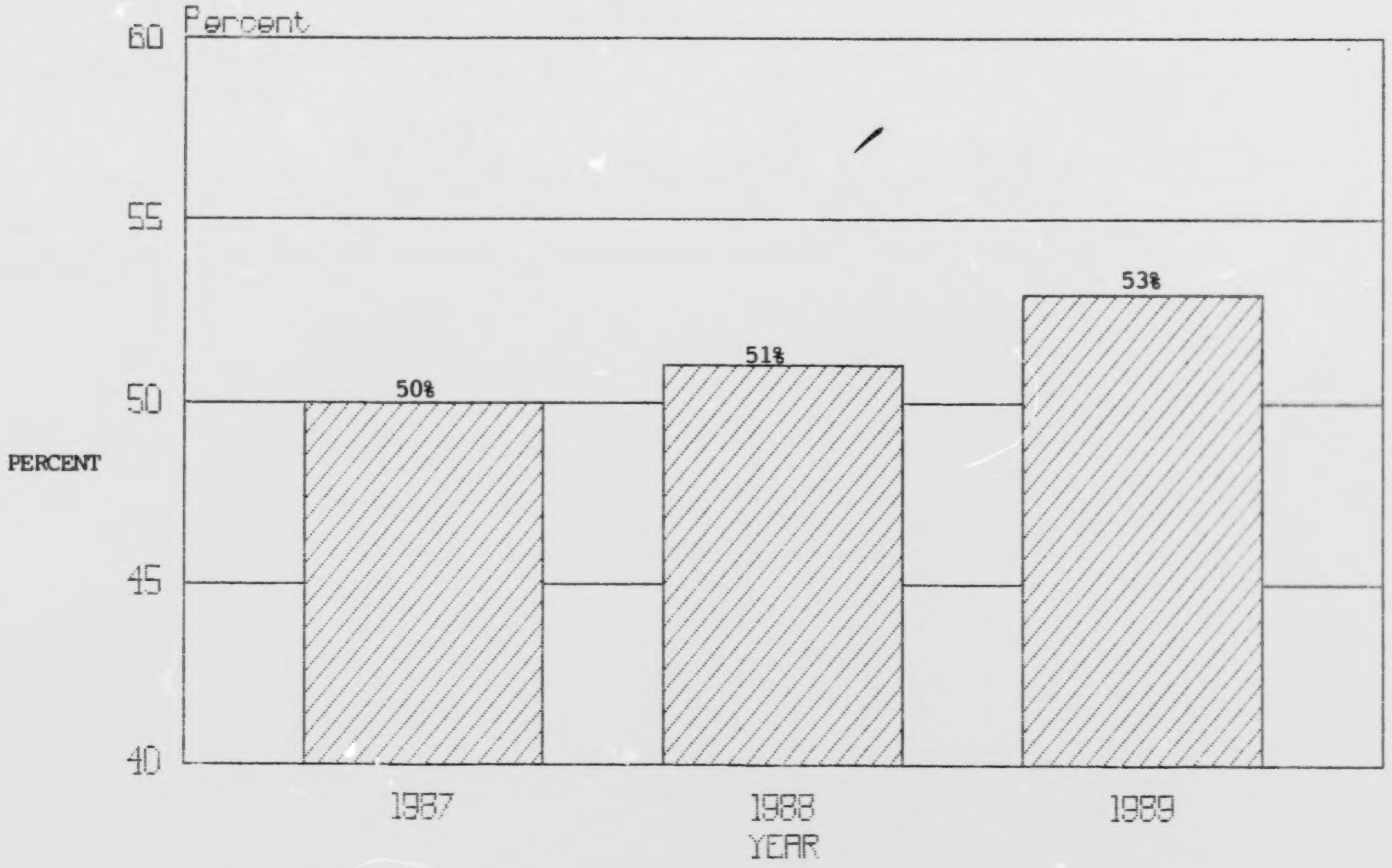
The project appears to have had a significant impact on the enrollment of recent high school graduates in Tri-County Technical College programs. Figure 3 shows a comparison of the College's overall enrollment growth, using 1987 as a baseline year, to the growth in recent high school graduates enrolling in credit programs. An analysis of these data indicate that:

- the proportion of recent high school graduates enrolling at Tri-County Technical College is growing at a faster rate than the overall College enrollment;
- growth in College enrollment of recent high school graduates has occurred continually even though there was a 3% (N= 98) decline in the numbers of high school graduates between 1989 and 1990;
- there has been a 45% growth in high school graduates entering College programs since 1987.

Another goal of the project was to increase enrollment in occupational degree programs at the two-year college level--those programs for which Tech Prep programs at the secondary level were linked. An analysis of Tri-County Technical College enrollment figures shows that an increase in occupational degree programs did occur during the project period (see Figure 4). However, the most significant increases occurred in the numbers of high school graduates entering the College's University Transfer programs. As mentioned previously this may be in response to rising costs at

Figure 1

Percentage of High School Graduates Choosing Postsecondary Education (Anderson, Oconee and Pickens Counties, S.C.)

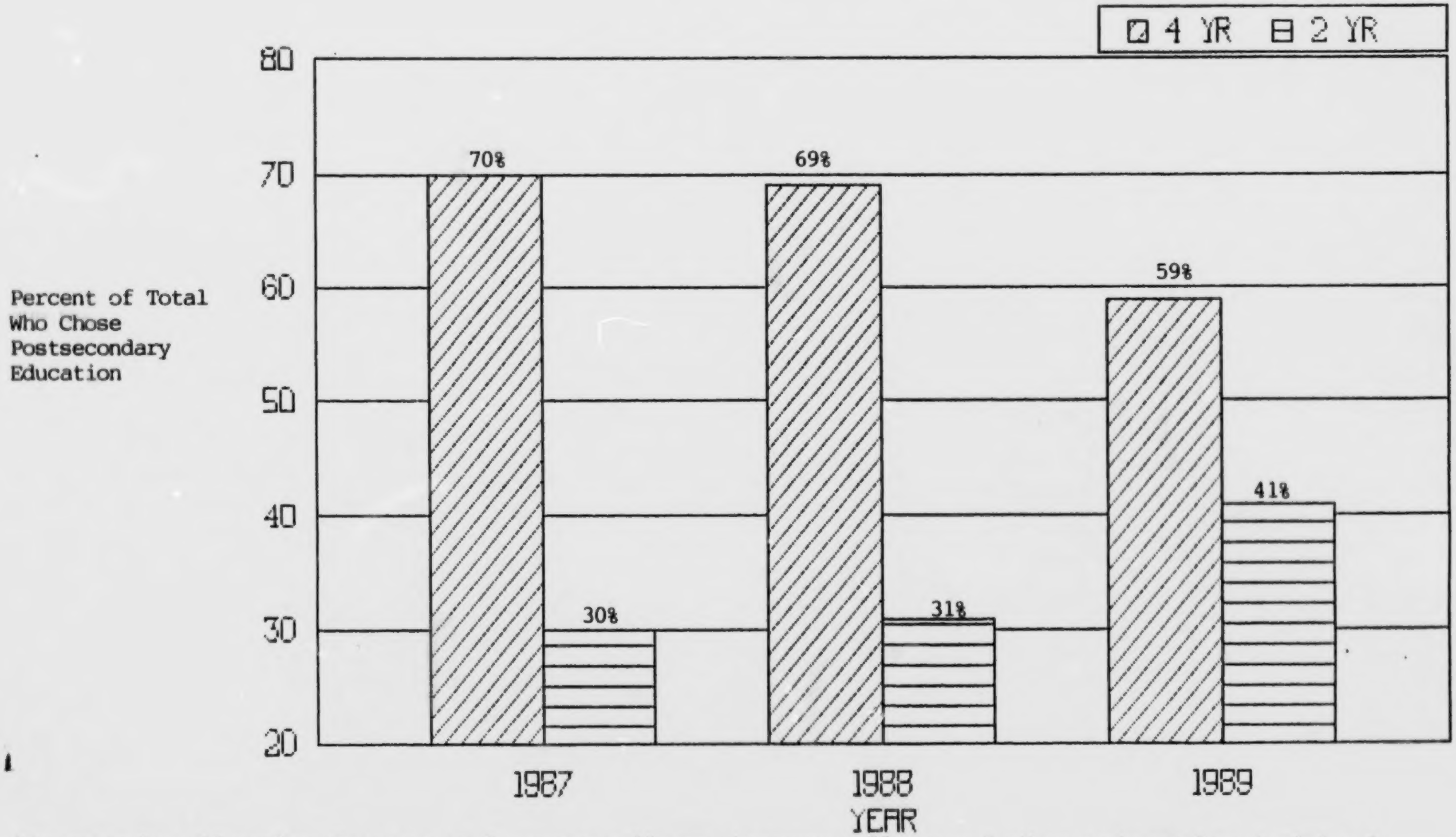


(Postsecondary Education--Entrance to four-year colleges, two-year colleges and other postsecondary training.)

Source: S.C. Department of Education Annual Reports. Data on 1990 graduates will not be available until November, 1991.

Figure 2

Comparison of Postsecondary Selections Among High School Graduates (Anderson, Oconee and Pickens Counties, S.C.)

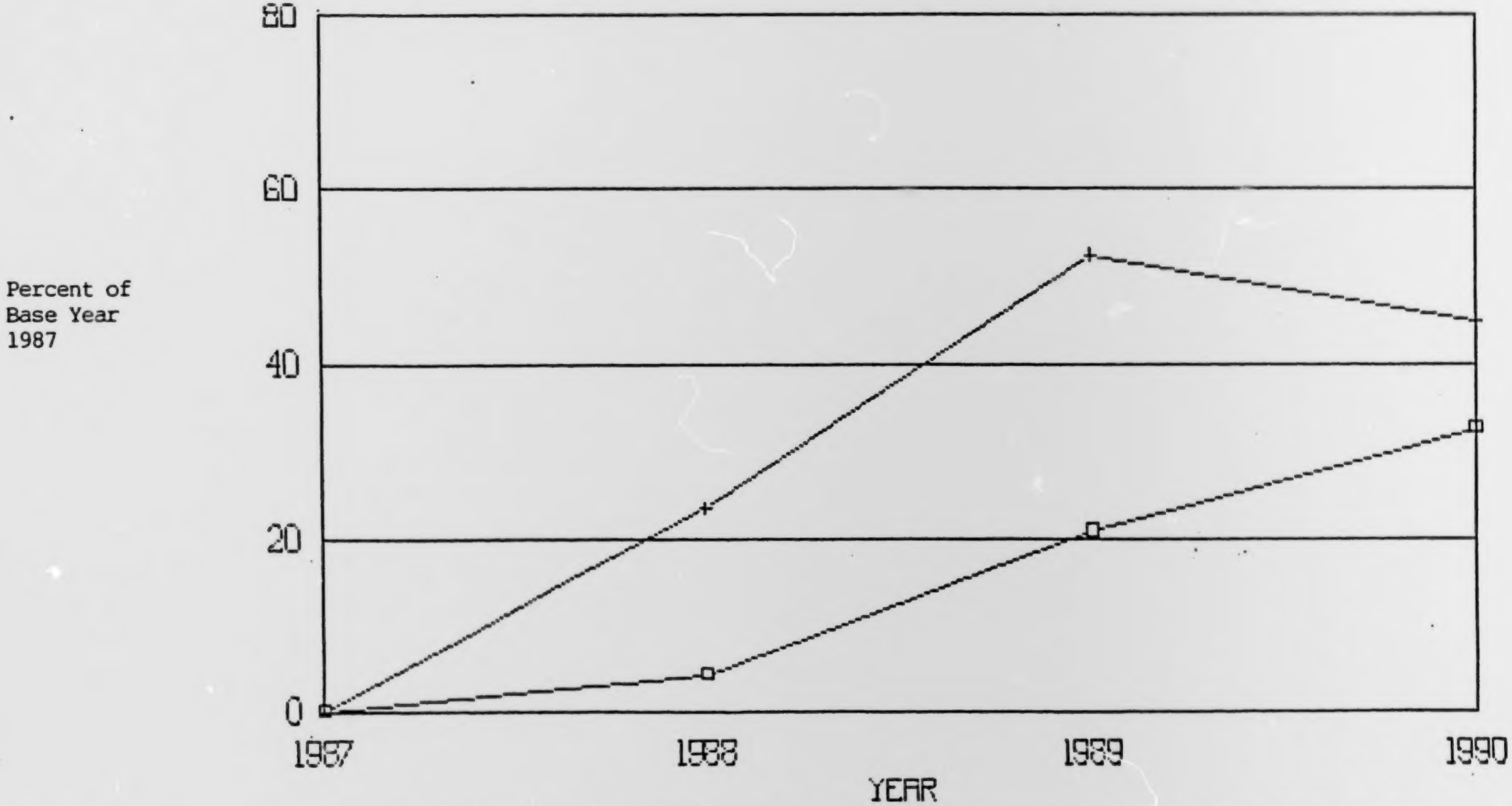


(Postsecondary Education--Entrance to four-year colleges, two-year colleges and other postsecondary training.)

Source: S.C. Department of Education Annual Reports. Data on 1990 graduates will not be available until November, 1991.

Figure 3

Comparison of Growth of Recent High School Graduates Entering Tri-County Technical College to Growth in Overall College Credit Enrollment



+ = recent high school graduate enrollment at Tri-County Technical College (fall terms)

□ = overall Tri-County Technical College Enrollment (fall terms)

Figure 4

Comparison of Majors Selected by Recent High School Graduates Upon Entry to Tri-County Technical College's Transfer (AA/AS) and Occupational (A.A.S./Diploma/Certificate) Programs

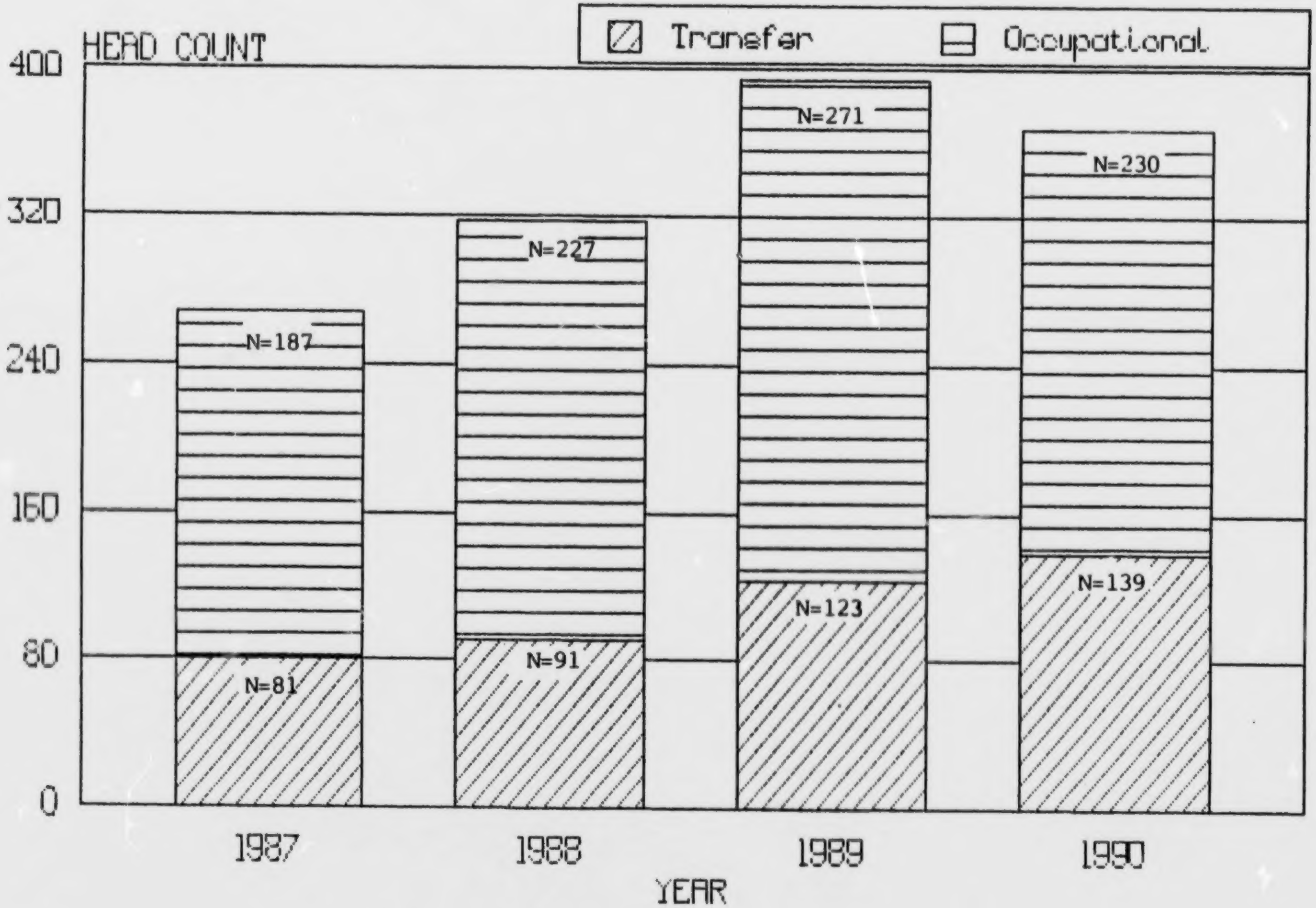


TABLE 1

	Total High School Graduates	Number of High School Graduates Entering Postsecondary Education	Number Entering Four Year Colleges	Number Entering Two-Year/ Other Postsecondary Education
1987	2902	1438	1007	431
1988	3061	1562	1072	490
1989	3109	1636	967	669

TABLE 2

	Number of High School Graduates	Number Entering Tri-County Technical College (TCTC)	Percentage Entering TCTC	Total TCTC Fall Credit Enrollment	Percentage of TCTC Total Fall Enrollment
1987	2902	285	9.8%	2236	12.7%
1988	3061	352	11.4%	2330	15.0%
1989	3109	435	13.9%	2705	16.0%
1990	3031	413	13.6%	2965	13.9%

four-year colleges but may also be explained by the increased exposure of University Transfer programs in the public schools as a result of this project. (University Transfer programs are explained as part of the guidance activities for Tech Prep in case students decide in their junior or senior year to pursue baccalaureate-level training.)

Although project staff anticipated that growth in the College's occupational programs would continue on an upward trend, the figures for 1990 show a different outcome. While still showing growth, enrollment in occupational degree programs dipped slightly from the previous year. In addition to fewer numbers of high school graduates in 1990 (reflecting population trends), project staff believe there is another important explanation for the dip in occupational enrollment. Because area Tech Prep programs stress the blending of academic and vocational skills in high school, more students may have been employable upon high school graduation in 1990. In addition, the Anderson, Oconee and Pickens County area was in a boom economy during 1989 and most of 1990 which resulted in plentiful opportunities for high school graduates with even minimal job skills.

Student Participation in Technical Advanced Placement (TAP)

The TAP components, used to reduce overlapping between high school and Tri-County Technical College curricula, took all of the first project year and half of the second year to develop. Students who were high school seniors in 1989 were the first to participate in Technical Advanced Placement. Twenty seniors from high schools in 4 districts participated in TAP during the spring of 1989. Slightly over 288 credit hours were awarded to 16 students who completed all the procedures. This credit at $19 per credit hour was worth $5481 in tuition fees. TAP participation in 1990 was not appreciably higher than the previous, year with eighteen students from high schools in five districts applying for TAP credit. Of the eighteen applicants, 15 students completed all the procedures and received 217 credit hours. Project staff believe that 1990 participation in TAP was slightly lower than the previous year for three reasons. First, the TAP component is still new and is not functioning as efficiently as it should. Second, there were no informational materials published in 1990 because new agreements were anticipated and finally, the guidance counselors have not been properly trained to advise students on Technical Advanced Placement. Strategies have been identified and implemented to overcome these problems and TAP participation is expected to increase for 1991.

3. Dissemination.

a. **Demand for Dissemination.** During years two and three particularly, project staff have been heavily involved in disseminating project materials, processes and products on a regional, state and national basis. The level of demand for information on this project was unanticipated by the staff. While exciting, the interest has been somewhat burdensome during the third project year when local development and implementation activities were finally gaining full steam and expanding almost continuously.

There appear to be four major factors which have resulted in the heavy demand for project dissemination:

1. The Perkins Act was being re-authorized by Congress and contained a new section entitled, "The Tech-Prep Education Act." A compromise bill was adopted and signed into law in September. The "Carl D. Perkins Vocational and Applied Technology Act Amendments of 1990" authorizes up to $125 million for Tech Prep development with a current appropriation of $63.4 million in new funds. The promise of federal funding has caused interest in Tech Prep development to skyrocket. (At the time of this report, projections are that $1.8 million will be available to support Tech Prep program development in South Carolina beginning in July of 1991.)

2. Tri-County Technical College, in conjunction with the American Association of Community and Junior Colleges (AACJC), operated a national Tech Prep Clearinghouse during the duration of this project. The Clearinghouse published a program description booklet in 1989 which included a summary of the PACE program. The publication was disseminated to hundreds of secondary and postsecondary educators from across the country.

3. Project descriptions were included in five national publications and/or data bases--FIPSE, FOCUS Network of the National Dropout Prevention Center, NOVA University's National Dissemination Network of Exemplary Programs for At-Risk Youth, the Center for At-Risk Student's national data bank at LaGuardia Community College and the National Directory of School-College Partnerships published by Syracuse University.

4. There is no research base for Tech Prep program development, only one major publication (The Neglected Majority, 1985) and a preponderance of programs across the country claiming to be "Tech Prep" when, in fact, they are vocational articulation programs with a new name. As interest in Tech Prep continues to grow, educators are searching for comprehensive programs which involve curriculum reform but at the same time are achievable within "real-world" limitations. The PACE project is one of very few which fits that description.

As a result of these and other factors, project staff have faced heavy demands to disseminate products and provide technical assistance within South Carolina and in other states. Staff have noted recently an increase in requests for technical assistance. While project materials are helpful, secondary and postsecondary educators are now seeking assistance to replicate or modify the project in other sites.

b. Dissemination Outcomes. Listed below is a summary of dissemination outcomes and highlights during years two and three of the project. (No records were kept on dissemination by the first project director and there has been a complete turn-over in professional and support staff since this project began.)

1. Response to 90 requests for information from educators, government/agency officials, private consultants and business professionals in 27 states and Washington, D.C. (October 1, 1988 through November 21, 1990. This does not include multiple requests from individuals or dissemination through workshops, conferences or site visits.)

2. Presentation of the project design and outcomes at national conferences (National Association of State Councils on Vocational Education [5/90]; American Mathematical Association of Two-Year Colleges [10/88]-presented by the College's mathematics department head).

3. Presentation of the project design and outcomes at state or regional conferences (S.C. Resource Development Officers Conference [9/90]; Center for Occupational Research and Development Tech Prep S.C./GA. Conference [5/90]; Alabama Technical College Deans' Conference [4/90]).

4. Co-Sponsor of "South Carolina Tech Prep 1990: The Challenge for Partnership" conference with the S.C. Board for Technical and Comprehensive Education and the S.C. Department of Education (6/90).

5. Coordination of nine site visits (4/90-12/90) from educators representing six S.C. school districts; four S.C. technical colleges; school and colleges from the Mansfield, Ohio area; and representatives from a North Carolina college, the National Center for Research in Vocational Education (California) and the Academy for Educational Development (Washington, D.C.).

6. The president of Tri-County Technical College and four representatives from area schools presented project-related sessions at a workshop for a newly-formed Tech Prep initiative in the Greenwood, SC area (11/90).

7. Completion of technical assistance activities for secondary/postsecondary educators in North Carolina, Ohio, Tennessee and five sites in South Carolina (1989, 1990).

8. Presentation of project information to the Governor of South Carolina and other prominent government and education leaders at the S.C. Education Summit (9/89).

9. Project director interviewed by USA Today for an article on issues in community college education (published 5/90).

10. Project director and a local Principles of Technology teacher wrote two chapters on the PACE project for Tech Prep/Associate Degree: A Win/Win Experience (Parnell and Hull, publication date anticipated during January, 1991).

c. Planned/Anticipated Dissemination Activities. Project staff have agreed to, or applied for, several opportunities for dissemination activities which will occur after this report is submitted. These activities include:

1. Presentation of project design and outcomes at three statewide conferences (Annual fall conference of the South Carolina Career Guidance and Placement Association [12/90]; "K-12/Higher Education Collaboration" conference sponsored by the Commission on Higher Education and the State Department of Education [1/91]; Annual conference of South Carolina Technical Education Association [2/91]).

2. Presentation of project design and outcomes at two national conferences (American Association of Community and Junior Colleges Annual Conference [pending acceptance, 4/91]; American Society of Engineering Educators conference [6/91]).

d. Special Statewide Dissemination/Technical Assistance. Interest in Tech Prep development throughout the state of South Carolina has increased markedly during the third project year. As a result, coordinators have been named in the fifteen other technical colleges, a coordinator at the state level has been named by the State Board for Technical and Comprehensive Education and a position paper has been published by a steering committee of the S.C. State Department of Education's Office of Vocational Education (the author and two area public school representatives serve on the State Department's steering committee).

Because the PACE project is the only one of its kind in South Carolina, and because interest in replicating the approach used by PACE is growing rapidly throughout the state, the State Board for Technical and Comprehensive Education (SBTCE) has recently contracted with the project director to provide statewide technical assistance. As of December 1, $22,000 in SBTCE funds have enabled full-time release for a Tri-County Technical College faculty member to join the PACE staff and includes funds for other support activities. This will free time for the project director to hold monthly planning meetings with state Tech Prep coordinators and to design a statewide training conference in the spring. It will also enable the project director to work closely with state-level leaders in identifying actions that will facilitate the development of Tech Prep programs across South Carolina.

4. Plans for Continuation.

a. PACE Organization and Postsecondary Components. When FIPSE funding ended on September 30, 1990, Tri-County Technical College provided $83,150 in institutional funds to maintain the staff and operation of the PACE organization through June 30, 1991. This operational budget does not include postage, graphics support and printing which are handled through institutional budgets. In November, the College purchased $5600 of computer equipment and desk-top publishing software to support PACE activities. Equipment purchases are in addition to PACE's operational budget for the remainder of the fiscal year.

Tri-County Technical College's support for the PACE project has been unprecedented and is evident through financial support, administrative support, faculty involvement and many other activities. College administrators have indicated continuing support and project staff are not concerned with having an identified "end-date" for project activities. There is no question that the College's Board of Trustees, president and other top-level administrators believe the PACE Tech Prep initiative is the best and most promising investment in community, economic and enrollment development to come along in decades. However, project staff are committed to securing other funds to expand the base of institutional support.

Project staff, in cooperation with the College's grants officer and area school and business leaders, have written and submitted three proposals to federal agencies in the last two years. While receiving favorable readers' comments, none of the proposals was funded. Other federal and private sources of funding will be explored in coming months. Project staff have identified a number of "phase two" components that now need to be developed in order to take the Tech Prep concept in directions that will enable even more effective implementation (see section 5 below). Even though current levels of institutional funding will enable important activities to continue, they are not sufficient to support expanded development activities in new, but related areas.

b. Secondary Components. All the development work on the secondary level related to this project has occurred with normal sources of school and district support. FIPSE funds have enabled technical assistance to be provided through project staff and the development of curriculum and support materials. Current levels of institutional funds will enable that assistance to continue without interruption. As mentioned earlier, the whole focus of program development has been to integrate changes which could be supported through normal funding. Therefore, Tech Prep programs in the public schools are as secure as any other curriculum option.

Project staff have noted, however, that the schools are starting to seek additional sources of funding to expand their Tech Prep approaches. For example, Oconee County schools just received funding to hire two occupational specialists for three schools as part of a new initiative called "Project Destination." This will increase the career counseling and personal assessment components of both the Tech Prep and College Prep curriculum options at Walhalla High School, Tamassee-Salem Middle/High School and Walhalla Middle School. The district is now identifying funding sources to expand the program to the remaining two high schools. Other districts are writing state grants to support curriculum expansion and/or counseling functions.

5. Future Plans And Directions. For the next few years, project staff will continue to assist area school districts to develop, implement and enhance their Tech Prep programs. Project staff are cognizant and accepting of the factors which limit the rate at which curriculum reform of this magnitude can realistically be expected to occur on the secondary level. However, because several

districts have the program fairly well established, there are now opportunities for additional development activities.

The work accomplished thus far with FIPSE support has provided a solid foundation for expansion and project staff can now identify future directions that were not evident in earlier years. For example, while staff have conducted numerous inservice sessions orienting faculty and staff to the overall concept, little has been done in teacher training. Some teachers are comfortable with the pedagogical changes caused by Tech Prep, but others are totally unprepared to teach applied content effectively. Teachers also need better training related to mid-level technology careers because applied courses blend career concepts and other classroom activities. Project staff would now like to bring local universities into the partnership to develop better in-service and pre-service training for Tech Prep teachers. Initial contacts with Clemson University have been favorably received for such expanded partnership activities.

Project staff have also come to realize that the business community and parents need improved and expanded opportunities to support the overall goals of Tech Prep. New activities are needed to coordinate and channel the involvement of these significant players to more effectively support students' educational achievement.

In addition, the guidance function has been impacted significantly by Tech Prep and programs are needed to make advising activities more effective for the non-baccalaureate bound student. It is interesting to discover that advising Tech Prep students is, in many ways, more complicated than helping students meet standard admission requirements to four-year colleges.

Project staff anticipate that these needs and others will take the Tech Prep concept in new directions as it continues to evolve. And the school districts of Anderson, Oconee and Pickens counties continue to develop creative spin-offs and directions for the program which will result in possibilities that are yet unknown.

F. SUMMARY AND CONCLUSIONS

In the early phases of this project local educators often expressed both enthusiasm and doubt that the stated objectives could realistically be achieved in a three-year period. Postsecondary educators particularly were skeptical that public school personnel would be open to change, especially to the degree required by this project. After three years of work, it is evident that public school educators were not only up to the challenge but were more creative and aggressive with the concept than the project developers could have ever imagined. Perhaps the project was a combination of the right idea at the right time.

There have been many insights gained as a result of the grant activity. These insights would certainly vary depending on whether they were expressed by postsecondary educators, public school educators, business representatives, parents or the students themselves. From the project director's viewpoint, the most significant insights have been the importance of recognizing individual needs, maintaining flexibility in adapting program concepts and establishing a true team approach to program development and implementation. In reflecting back on the past three years, these concepts provided the foundation for change and were the underlying reasons for the project's success.

When the project began, the primary focus was to build a "seamless" educational pathway from local schools into associate degree programs at Tri-County Technical College. However, ideas have changed and the focus is evolving into a generic two-year college prep option that provides postsecondary access on a wider basis. Because public schools do not endorse one postsecondary option for their college prep students, those associated with the project have come to see that the same approach should be used for Tech Prep students. Tri-County Technical College administrators have accepted this approach believing that what is best for students will also, in the long run, be the most beneficial for the College and the community.

Over the past three years, project staff and College administrators have also changed their ideas concerning the scope of the project and the potential outcomes. While in the beginning, this was considered a project with an anticipated completion date, it is now thought of as an evolving partnership without a definitive ending point. Tech Prep is being integrated into the normal offerings and procedures of both secondary and postsecondary institutions which will result in a continuing inter-relationship between the two levels of education. New possibilities for collaboration seem to surface continually and enthusiasm to work in these directions gets stronger with each successful endeavor. It seems reasonable to conclude that as with any hierarchy, a return to lower levels of thinking is not likely.

Should other practitioners desire to develop programs similar to the PACE project, the staff would urge them to consider one piece of advice--pursue the development of Tech Prep programs with flexibility, creativity and commitment. To us, this was not a "project" but the opportunity of a professional lifetime to truly make a difference in our community and in the lives of thousands of students.

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The most valuable assistance provided through FIPSE was the support to make the project to work in the "real world." This support was noticeable in many ways, but was particularly evident from our program officer, Dr. David B. Arnold. It was Dr. Arnold's interest in this project and his encouragement that enabled us to change directions with confidence and, ultimately, to reach the level of success we had originally envisioned.

In retrospect, the flexibility and level of support expressed through FIPSE personnel, and activities such as the annual project directors' meetings, was crucial to the success of a project of this magnitude. As our work progressed, we came to understand that this "project" was having significant impact on secondary education as well as on the reputation and image of Tri-County Technical College with area schools, the local community and other technical colleges in the state. FIPSE's recognition that innovation requires on-going analysis, creativity and flexibility has enabled us to move from simply meeting grant objectives to implementing changes that will continue to generate positive outcomes into the foreseeable future.

Should other proposals be submitted to FIPSE involving community college/public school/industry partnerships, this project director would offer several suggestions to the reviewers. First, because projects of this type deal with diverse institutions and perspectives as well as different regulatory and political environments, reviewers should look for evidence that a solid working relationship exists between the partners prior to initiation of the project. If not, it could easily take the whole project period to develop the kind of communication and working structures conducive to development work of any kind. Second, since the project staff will most likely be postsecondary educators, reviewers should look for evidence that key personnel are knowledgeable and capable of developing effective programs linking secondary and postsecondary programs. These two issues are critically important and may be somewhat related--community college educators do not have much history in working with the public schools and the schools may not automatically see community college involvement as beneficial. (While there is a long and generally well-accepted history of university involvement with public education, the role of community colleges in public education is not nearly so well established.)

The author would also encourage FIPSE reviewers to look for stronger than usual evidence that support for the project will continue after FIPSE funding. Because partnership projects are much more "public" than other types of projects, the consequences of failing to continue appropriate activities could be disastrous, particularly for the community college. Two-year institutions are impacted strongly by negative feelings in the community and "pulling out" of a successful, community-based project would surely guarantee some unpleasant consequences.

If FIPSE is interested in enhancing the nation's growing Tech Prep movement and expanding opportunities for the "neglected majority", this author would encourage funding teacher training projects highlighting partnerships between universities, community colleges and public schools. As a result of our project, we believe that teacher training is a particularly important area of need. While community colleges can help facilitate the development of Tech Prep programs, they cannot solve the problem of new teachers entering changing classrooms with traditional techniques. An alliance of universities, public schools and community colleges would be a powerful partnership in effectively meeting the challenge of making "winners of ordinary students."

INTRODUCTION TO TECHNOLOGIES

Preparing Students For Mid-Level Technology Careers

Teacher's Guide

BEST COPY AVAILABLE

Introduction to Technologies

..preparing students for Mid-Level Technology Careers

TEACHER'S GUIDE

developed by:

Mr. Johnny M. Wallace
Associate Director/Curriculum Developer

The Partnership for Academic and Career Education expresses appreciation to the following educators for their assistance in the development of this course:

Betty Palmer, Crescent High School
Charles Lawson, Crescent High School
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(September, 1990)

This course was developed with support of the U.S. Department of Education's Fund for the Improvement of Postsecondary Education (FIPSE) as part of a three-year grant awarded to the PACE Partnership. However, the opinions and informationpresented in this material do not necessarily reflect the positions or policies of this entity, and no official endorsement by them should be inferred.

RATIONALE

Education in South Carolina and America must provide students with an awareness and understanding of careers being added or changed in the workforce due to technology. Technological changes in the workplace necessitate proper academic and vocational preparation.

Jobs being created in the workforce will require much more than the simple basics of reading, writing, and arithmetic. New "basics" will require employees to:

- solve various problems which do not have a standard solution;
- carry out instructional processes which may be oral, written, diagrammatic, or a combination thereof;
- perform mathematics-related problems requiring higher levels of mathematical ability with algebra and geometry skills as a minimum;
- have a greater understanding of a wider scope of subjects ranging from the simple to the complex.

COURSE GOALS

The Introduction to Technologies course is designed to:

- provide manipulative and experiential activities that give students insight into vocational and mid-level technology careers;
- help students fully understand the importance of a proper high school education in preparing for a career or pursuing postsecondary education;
- help students develop a greater awareness of their own personal skills, abilities, likes, and dislikes;
- provide students with an opportunity to explore career-related topics such as job searching skills, life skills, making college education a reachable goal, and study skills;
- allow students to examine self-esteem and the impact self-esteem has on self-perception;
- develop fundamental technology skills through hands-on, experiential activities.

FOREWORD

Introduction to Technologies is a new course designed to provide hands-on experiences; knowledge about changes in the workplace; and exploration of career opportunities associated with changes in the workplace. Students are given the opportunity to explore careers and career-related information through various activities such as interviews, guest speakers, and on-site visits to businesses and industries and local colleges as well as through classroom activities.

Introduction to Technologies goes further than just giving students an understanding of career opportunities. This course also covers such areas as self-esteem and the associated effect upon selecting a career; study skills and how to get the most out of high school; and ways of making a college education possible among others.

Introduction to Technologies is designed as a semester course to be taught at the ninth or tenth grade level. However, the units in this course can be broken apart and used as supplemental materials for courses already in place within the school setting. There is no set textbook for this course. However, it is highly recommended that the book WORKING: Today and Tomorrow, copyright 1987, from EMC Publishing be obtained if at all possible (See list of Unit I Resources for ordering information). This book can serve as an additional resource to the units covered in Introduction to Technologies.

Since Introduction to Technologies is a semester course, it is recommended that students enroll in a computer class for the other half of the school year. Knowledge of computers is a necessity in today's workplace because of the advancements in technology. By combining Introduction to Technologies and the development of computer skills, students will gain a greater understanding of the basic requirements to be successful in the ever changing workplace.

The following is a synopsis of each unit for Introduction to Technologies.

Unit I--The Changing World Of Work

Today's workplace is vastly different from that of yesterday and tomorrow's workplace will be different from today's. Students must be made aware of how and why these changes have and will occur and provided with an understanding of what they must do now to ensure themselves of a place in the workforce of tomorrow.

Unit II--Personal Inventory

Very often students seek employment which does not necessarily fit their skills and/or interests. Being happy in the workplace means analyzing personal skills and abilities to determine strengths and weaknesses and then identifying compatible careers.

Unit III--Mid-Level Technology Careers

The impact of technology upon the workplace has created new careers. More often than not, these careers fall into the mid-level range, those which require some postsecondary education but not necessarily a four-year degree. Students must be made aware of these careers and the fact that these careers offer excellent salaries and opportunities for advancement without the requirement of a bachelor's degree.

Unit IV--Self-Esteem

Self-esteem is an important factor in how people perceive themselves and their ability to accomplish personal goals. Helping students feel good about themselves and providing opportunities for them to make improvements will create greater self-confidence to seek careers which were once only part of a dream.

Unit V--Job Searching Skills

The first impression applicants often make upon prospective employers is through either a letter of application or a job application. Personnel managers are telling educators that prospective employees cannot successfully complete a job application. As a result, prospective employees are often perceived as lacking skills needed to be successful in the occupation for which they have applied.

Unit VI--Life Skills

Life skills involve more than being able to write checks and balance a checkbook. These skills include a basic understanding of housing, transportation, borrowing money, insurance, and employee benefits. All of these, and more, affect the amount of "real money" an individual will have to lead a comfortable life style. Comfortable lifestyle is closely related to the career chosen and the level of education attained.

Unit VII--Making College Study a Reachable Goal

Employment in the future will require formal educational studies beyond high school. In fact, "by the year 2000, the average job in the Southeast will require almost fourteen years of formal education" (The Southeast's 21st Challenge, U.S. Department of Labor, Spring, 1990). Many students, and their parents, may not have the means by which to finance the cost of a postsecondary education either on the two- or four-year level. Various options for financing a postsecondary education are now in existence. An increased awareness of these options will help students to realize postsecondary education is no longer just a dream, but can become a reality.

Unit VIII--Entrepreneurship

Students often dream of owning their own business. More often than not, they see only the glamour side of "being your own boss." Students are not aware of all the "hidden" details that must be taken into consideration as the owner of a business. Insight into the many different and often cumbersome details associated with owning a business may help some students realize ownership is not for them while others may come to just the opposite conclusion.

Unit IX--Study Skills

Students often complain about not having enough time to complete homework assignments, spend time with friends, and hold a part-time job. If students are shown how to maximize their time, they will realize that very often several valuable hours are wasted each day. By analyzing the way their time is spent, students will see that by adjusting their present schedules they will be able to accomplish more in the same amount of time.

APPENDIX A

Appendix A contains a list of resources which teachers can use to gain additional information regarding the various units in Introduction to Technologies. Many of these resources are located in the PACE office and can be checked out by teachers. This is by no means an exhaustive list of resources. Teachers may have other sources of materials they can integrate into the course. Anyone interested in checking out materials located in the PACE office can call 646-8361 ext. 2107.

APPENDIX B

Appendix B contains copies of handouts which must be used to complete many of the activities in Introduction to Technologies. These handouts may be used as given or may be modified by the teacher and/or students. Teachers are encouraged to supplement the handouts with other relevant material.

APPENDIX C

Appendix C is a compilation of articles, documents, and publications which will provide teachers with some background information about changes occurring in the workplace. These materials are intended to give teachers a better understanding of why students need to be made aware of the new and emerging careers in the workplace.

Also included in Appendix C is a copy of The Guide to Area Business Speakers published by PACE. This guide lists area business professionals who are willing to address student groups and the topics the speakers will discuss.

UNIT I
THE CHANGING WORLD OF WORK

MAJOR CONCEPT The world of work is constantly changing due to the impact of technology upon the work environment.

TOPICS

1. jobs of the past, present, and future
2. future employment projections
3. impact of technology on the workplace
4. skills needed for success in today's workforce
5. the impact of technology on the global workforce
6. oral and written communications as critical skills for the world of work

BEHAVIORAL OBJECTIVES

At the conclusion of this unit, the student will be able to:

1. define global economy and the international workplace;
2. compare and contrast jobs of the past, present, and future;
3. discuss data relating to employment projections of the future, including, but not limited to, career opportunities that will decrease in availability, remain constant, or increase in availability;
4. explain the role of technology in changing the local, national, and international workplace;
5. use the South Carolina Occupational Information System (SCOIS) to obtain career-related information;
6. define transferable skills;
7. explain the relationship between transferable skills and job retention/promotion;
8. make oral and written reports to the class.

ACTIVITIES

1. Have students begin a careers notebook for themselves. This notebook should be used to store information presented throughout the course. Students will be able to use this compilation of information during their high school years to help in setting goals for plans upon completion of high school.

2. Have students compare and contrast projections for selected occupations in the local county, state, and nation. Provide students with handouts that summarize these projections. **(See Resource List in APPENDIX A for possible sources of information. Also, a handout entitled "Growth in Occupations 1988-2000" is in APPENDIX B.)**

3. Lead students through a discussion of the role written and oral communication skills play in presenting information to groups on the job. Explain to students that these skills will be developed as a part of this course. At various times throughout the course, students will be asked to make oral and/or written reports to class members.

   Explain how oral reports can be enhanced by use of:
   - --overhead transparencies;
   - --posters;
   - --displays;
   - --handouts.

   Discuss the fact that oral reports give information in summary form where as written reports present more detailed information. Also, written reports can be filed and used as reference materials at a later date.

4. Have students trace the changes that have occurred in the workplace over the past century. This activity can be enhanced by separating students into groups with each group selecting a topic to research. Suggested topics include:
   - --comparison and contrast of agrarian, manufacturing, and service societies;
   - --how the American society has changed;
   - --the role of technology in causing changes in the American society;
   - --the impact of technology upon jobs of the future;
   - --global economy and international workplace.

   After each group has completed its research, a group paper should be given to the teacher. Oral reports should be used to present information to the class, as well as having a written summary for students to include in their careers notebook.

5. Have students collect job advertisements from local newspapers and analyze the ads to determine what types of skills are required for entry into a specific occupation. Tell students to pay special attention to ads regarding industrial/engineering, allied health, public service, and business careers. Students should be encouraged to search for ads referencing two-year degrees. **(APPENDIX B contains handouts with job ads. These handouts can be duplicated and given to students for this exercise.)** However, by searching the newspapers, ads which highlight careers of interest to the students can be selected.

   Students should select one ad and write the personnel manager of the business/industry advertising the position asking for such information as:
   - --specific requirements for entry into the occupation;
   - --types of skills (communications, math, etc.) needed for the job;
   - --opportunities for advancements;
   - --opportunities for future training/education offered by the company.

   Students should explain that this information is being sought as part of a class assignment. Students should summarize findings and report to the class. Also, have students provide a summation sheet for other students to place in their careers notebook. **(The "Researching A Career" sheet can be used for this activity. See APPENDIX B for a copy of this activity.)**

6. Lead students through a discussion of the changing job market and the fact that employees often change careers which may require learning new skills. (This would be an excellent opportunity to have a guest speaker talk about retraining in the workplace and life-long learning.)

   Skills learned in one context can and should be transferable to another context. The filmstrip series "Transferable Skills" can be used to help students understand what is meant by transferable skills.

   This series includes sections on:
   --Making School Meaningful--Transferable Skills
   --About Transferable Skills
   --Guidelines for Encouraging Transfer
   --Activities for Encouraging Transfer
   --Identifying Transferable Skills

   Using the teacher's guide, have students complete the activities associated with the filmstrip series. (This series is located in the PACE office and is available for teachers to borrow.) Emphasize that although many skills seem to be taught in isolated settings, these aptitudes can be transferred to a different setting, allowing a person to apply "old" abilities in a new position.

7. Invite the guidance counselor to give the class an introduction to the South Carolina Occupational Information System (SCOIS). This introduction should include:
    - --the types of information which can be obtained from SCOIS;
    - --when the system is available for student use;
    - --how to utilize the system to gain specific information related to occupational interests.

   After the presentation has been completed, assign students specific tasks to be completed using SCOIS. **(SEE ACTIVITY 8)**

8. Have students begin researching careers, both common and not-so-common, by using the job cards located in **APPENDIX B.** These cards can be duplicated on heavy paper, laminated, and cut apart for use in this activity. (There are 90 career cards so this activity can be repeated several times during the semester.) Have each student select one of the job cards and then research the career using the **"Researching A Career"** sheet located in **APPENDIX B.** Much of the information needed to complete the activity can be found through SCOIS. If possible, post these career sheets in a central location within the school for non-class members to examine.

9. Have students interview a parent, relative, or other individual to gain information about his/her present employment. **(A sample questionnaire entitled "Employee Interview" is included in APPENDIX B or students can create their own.)** Information being sought might include:
    - --how the job/occupation has changed in the past ten years;
    - --new skills learned to remain employed in the occupation;
    - --math, communication and science skills used on the job;
    - --educational background/training.

   Have students share their findings with the class through reports. Written reports should be duplicated for students to place in their careers notebooks.

UNIT II
PERSONAL INVENTORY

MAJOR CONCEPT Personal likes, dislikes, interests, and attitudes play an important role in job satisfaction.

TOPICS
1. likes and dislikes
2. personal attributes/aptitudes
3. interests
4. attitudes and values
5. shadowing an employee

BEHAVIORAL OBJECTIVES

Upon completion of this unit the student will be able to:
1. analyze a personal interest inventory;
2. identify careers which match the student's likes, dislikes, and interests;
3. select two or three careers, based on the personal inventory profile, and research these careers to gain an understanding of the careers;
4. select one career and conduct an interview with an individual employed in this career;
   summarize the interview and report findings to the class;
5. identify factors wanted in a career (ex. salary, advancement opportunities, travel, etc.);
6. explain the difference between needs and wants;
7. explain the meaning of aptitude;
8. define short-, medium-, and long-range goals and identify types of each;
9. explain the role of attitude in securing and keeping a job;
10. shadow an employee for a day and summarize the experience; include such things as work schedule, job duties, workplace skills, etc. (**OPTIONAL**).

ACTIVITIES

1. Students should complete a personal inventory profile to determine likes, dislikes, hobbies, and interests. Two inventories are School Interest Inventory, by Riverside Publications, a paper and pencil inventory and The Career Compass, by Meridan Publications, a computerized inventory. (Ordering information is provided in the List of Resources for Unit II.)

2. Have students select two careers of interest and complete a careers profile. After the profiles have been completed, have students compare the profiles with their findings from Activity 1. If career choices do not match personal skills, have students look at alternative careers in the same cluster area.

3. Lead students through a discussion of the term "comfortable lifestyle." On the blackboard, list items students feel are necessary to lead a comfortable lifestyle. Once the list has been completed, identify the items as actually being wants or needs. Lead students through a discussion of wants and needs and the relationship between the two.

4. Lead students through a discussion of "job satisfaction." The discussion should focus on the fact that an excellent salary does not necessarily mean job satisfaction. Other factors, such as working conditions, amount of authority, autonomy, and opportunities for advancement also affect job satisfaction. (Have students examine their career profiles from Activity 4 in terms of related job satisfaction.)

5. Lead students in a discussion of goals and goal setting. Define short-, medium-, and long-range goals and planning. Have students set goals of each type. **(Two sources of materials for this exercise are located in Getting Smarter and Learn How to Learn. The related chapter concerning goals, goal-setting, and motivation from Getting Smarter can be found in APPENDIX B. See List of Resources for additional information on ordering these books.)**

6. Have students complete the activity "Into The Future." This activity should help students realize the need to begin to prepare early to be successful in their chosen career. **(A copy of this activity is located in APPENDIX B.)**

7. If it can be arranged, have students "shadow" an employee for a day. This employee could be a parent, other relative, or friend. Some industries are hesitant about allowing non-employees in working areas; therefore, it will be necessary to get written permission from the industry for this exercise to be completed.

   Options to the full day of shadowing are:
   - --have students complete this exercise for a portion of the working day.
   - --set up a field trip to a local industry. (Before going on the field trip, have students determine what specific information they will be looking for while on the trip. Remind students they will be making presentations about the field trip.
   - --have students with a part-time job in a technical area, make presentations regarding the types of skills required for their job.

   After students have completed the "shadowing" experience, give them the opportunity to discuss what transpired. Have students write a short report which can be duplicated for other students to put in their careers notebook.

UNIT III
MID-LEVEL TECHNOLOGY CAREERS

MAJOR CONCEPT The greatest percentage of new job opportunities will require some type of postsecondary education.

TOPICS

1. definition of mid-level technology
2. skills needed in mid-level technology careers
3. sources of training for mid-level technology careers
4. role of technicians
5. preparing in high school for further training related to mid-level technology careers

BEHAVIORAL OBJECTIVES

Upon completion of this unit the student will be able to:

1. define and give examples of mid-level technology careers;
2. identify careers classified as mid-level technology careers;
3. select two or three mid-level technology careers and research each to determine the following information:
    - --high school preparation;
    - --post-secondary education opportunities;
    - --salary ranges;
    - --projections for availability of jobs;
    - --working conditions;
    - --needed workplace skills;
    - --type of work involved;
4. select one mid-level technology career, conduct an in-depth study of the career, to include an interview, and report findings to the class (include information from objective 3 along with local employment opportunities, advancement opportunities, etc.);
5. visit a local technical college and tour the various departments preparing students for mid-level technology careers;
6. summarize the differences in career opportunities based upon the level of education achieved; high school diploma v. two-year degree v. four-year degree);
7. construct a bulletin board display highlighting various mid-level technology careers;
8. write articles for the high school newspaper which detail mid-level technology careers;
9. summarize a panel discussion of mid-level technology careers, specifically non-traditional careers;
10. identify the "basic skills" needed to be successful in a mid-level technology career;
11. summarize the various vocational/occupational programs offered at the local high school and/or career center.

ACTIVITIES

1. Have students research mid-level technology careers. (Mid-level technology careers are careers which require some educational preparation beyond high school but not necessarily a four-year degree. Students should develop a list of general characteristics which describe mid-level technology careers. Characteristics described should include:
    - --level of education required;
    - --working relationship with peers (group v. individual);
    - --salary ranges;
    - --advancement opportunities;
    - --type of work;
    - --basic skills needed for career competence.

2. Have students identify two or three mid-level technology careers which interest them. Have the students research these careers to find such information as:
    - --courses to be taken in high school;
    - --types of postsecondary education opportunities which exist;
    - --working conditions/duties;
    - --salary ranges.

   Most of this information can be found by using SCOIS. Students should summarize their findings and make a report to the class. **(The "Researching A Career" Profile can be used with this exercise.)**

3. Have students select one of the career options from Activity 2 and conduct an in-depth study of the career. If possible, have the student interview someone presently employed in this career. (Before students conduct their interviews, have them write a brief description of what they perceive as skills needed for the career. This will be used later to compare their idea of the career with the actual career.) Students should obtain as much information, from as many sources, as possible. Have the students report findings to the class. Reports should contrast students' perceptions of the career with the realities of the career.

4. Arrange a tour of a local technical college to give students an understanding of the educational programs available at the college and how these programs can prepare students for rewarding careers in the mid-level range.

5. Invite a guest speaker to address the differences in employment opportunities based upon the level of education a person completes. Topics should include the differences in salary, advancement opportunities, and supervisory responsibilities.

6. Have students construct bulletin board displays to highlight mid-level technology careers in the four cluster areas of business, health occupations, human services, and industrial and engineering technology. Suggestions of how to implement this activity are
   --break class into four groups;
   --have each group select one of the four cluster areas around which to develop the display;
   --allow students an opportunity to brainstorm about the type(s) of information they wish to include in the display;
   --bring students back together as a class to discuss ideas (this will give other groups an opportunity to provide feedback about the ideas selected);
   --have students make a list of resources to be used in gaining information needed to make the bulletin board display.

   Highlight each of the four cluster areas at different times during the semester. If it can be arranged, place the displays on bulletin boards where all students can see them. **(The "Researching A Career" profiles from Unit I, Activity 8 can be used as part of this display.)**

7. Invite several guest speakers to participate in a panel discussion of mid-level technology careers (Speakers selected should be employees in mid-level technology careers). Teachers may wish to consider the following when inviting guest speakers:
   --invite employees, not employers, if possible;
   --invite parents or relatives of students;
   --invite employees in non-traditional male and female careers (ex. male secretary or female technician);
   --ask speakers to bring information concerning careers: have students put this information in their careers notebooks.

   The Guide to Area Business Speakers, published by PACE, is an excellent source of speakers. (A copy is included in **APPENDIX C.**)

8. Talk with the high school newspaper advisor and discuss the possibility of starting a "careers corner" in the newspaper. (Students in Introduction to Technologies will write the articles.) This column will be used to highlight mid-level technology careers.

   If the newspaper advisor agrees, group students and have each group select two careers to be highlighted. Each group will be responsible for deciding the type(s) of information to be included in the article, how the information will be collected, and the writing of the article. Set up a time line so each group will have ample opportunity to fully develop each article.

9. Meet with the various vocational teachers at the local high school and/or career center to develop a "buddy system" whereby students enrolled in Introduction to Technologies visit the vocational courses at the high school/career center. While visiting in the various vocational courses, students enrolled in Introduction to Technologies should be given the opportunity to participate in hands-on activities in the lab setting.

   Students should be given the opportunity to experience hands-on activities in each the cluster areas of allied health, business, industrial and engineering, and public service.

   This activity could be conducted at different times during the semester to provide students with the opportunity to visit a course in each of the cluster areas.

10. Arrange a field trip to the local hospital. Since many new jobs are being created in the area of allied health, this trip will give students an opportunity to visit the various departments and learn about health careers in the mid-level range. Before the field trip, have students research health careers and develop a list of questions they would like to have answered while on the field trip.

UNIT IV
SELF-ESTEEM

MAJOR CONCEPT Self-esteem has a major impact upon how an individual perceives himself and his ability to be successful in a given situation.

TOPICS

1. self-esteem impacts the way an individual perceives himself
2. self-esteem impacts a student's school performance
3. self-esteem is one determining factor in career selection
4. self-esteem can be raised with proper nurturing
5. self-esteem is influenced by many factors, including home environment, parental expectations, and school environment

OBJECTIVES

Upon completion of this unit the student will be able to:

1. define self-esteem;
2. discuss ways of reinforcing positive self-esteem;
3. complete exercises on self-esteem;
4. list ways of increasing self-esteem;
5. describe various factors that influence self-esteem;
6. discuss the relationship between self-esteem and the learning process;
7. discuss the role of self-esteem in being successful in a chosen career;
8. compile a personal file containing papers, notes, etc. of which the student is proud.

ACTIVITIES

1. Have students identify an individual they perceive as being successful. Have students make a list of traits they feel have contributed to this person's success. If students do not grasp the idea that this person thinks of himself as a winner, lead the students through a discussion that will bring them to this conclusion. Students should be made aware that individuals can overcome the "odds" and be successful through perseverance.

2. Bring in a guest speaker to present his story of overcoming "the odds" and succeeding even though everything pointed toward failure. Students should compile a list of questions they would like answered before the speaker makes the presentation. The speaker can help students realize success comes as a result of overcoming seemingly insurmountable odds.

3. Have students create a section in the careers notebook called "personal accomplishments." In this section, students should keep materials of which they are especially proud. Examples might include papers with excellent grades, notes of praise from teachers, awards, or other special recognitions.

4. Have students complete the exercise entitled **"Are You Being Manipulated?" (A copy is included in APPENDIX B.)** This activity gives students the opportunity to understand manipulation and how it affects the self-esteem of others as well as themselves. This activity also helps students see manipulation as both passive and active.

5. **The New Model Me** curriculum gives students the opportunity to examine their behaviors and the resulting effect on others. Over 100 hundred different activities are included in the curriculum. The teacher should decide which activities can be used with each class. These activities can be interspersed through Introduction to Technologies as the teacher desires. **(NOTE: Several schools offer The New Model Me as a semester course. Teachers should check with counselors before ordering any materials. The Resource Listing has information regarding ordering the materials.)**

UNIT V
JOB SEARCHING SKILLS

MAJOR CONCEPT Proper job-searching skills preparation increases chances of securing the desired career.

TOPICS

1. proper interviewing techniques are often the selling point in a job interview
2. a concise and properly written resume is essential in job hunting
3. written communications, such as letters of application and resumes, often give the first impression of an individual
4. oral and written communication skills are important in job searching
5. proper researching of career clusters can help minimize the amount of time spent researching career opportunities
6. physical appearance has a major impact on the interviewing process
7. self-confidence can help in marketing yourself

OBJECTIVES

Upon completion of this unit the student will be able to:

1. write a correct letter of application;
2. write a correct resume;
3. explain the significance of good communication skills in securing a job;
4. participate in mock interviews;
5. critique mock interviews;
6. list ways of researching career options;
7. analyze job advertisements in order to know what is presented;
8. summarize a presentation given by an employee of the local job placement agency.

ACTIVITIES

1. Invite a personnel/human resource manager to come and address the class concerning letters of application, resumes, interviews, entry-level requirements, education requirements, etc.

2. Discuss writing resumes and letters of application. Have students finalize a letter of application and resume. If possible, contact several personnel directors and have them evaluate the letters and resumes and provide feedback to the students.

3. Have students complete several different job applications. By using different applications, students will see that companies ask for diverse information. Also, students will see that many businesses and industries require applicants to write a response to a given question. **(Several applications from local businesses and industries have been included in the resource section in APPENDIX B. The names of the companies have been removed so as not to reveal the source of the applications.)**

4. Lead a discussion on communication skills. Emphasize communication as being more than just listening, reading, or writing. Nonverbal cues such as facial expression, body language, and eye contact are "communication skills" which may communicate meanings different from spoken messages.

5. Lead a discussion on proper interviewing techniques then have students participate in mock interviews. Video these interviews so students can critique their performances. Discussion topics should include areas such as tonal quality, posture, dress, punctuality, and grooming.

6. Discuss various ways of locating information about careers. Have students write a brief synopsis of how a person might go about obtaining information from each source. Discuss sources such as newspapers, local employment security office, SCOIS, etc. Have students compile a summary of the types of information that can be obtained from each source. All summaries should be placed in the careers notebook.

7. Have students select job advertisements and analyze the information given in each. Also, have students discuss additional information needed before deciding whether or not to apply for the position. Identify ways of obtaining this information (example: telephone, letter, visit to the company, etc.).

8. Invite a representative of the local job placement agency to address the agency's role in helping businesses and industries secure employees.
9. Job Search Education is a workbook which provides activities associated with the development of job search skills. Sections included are "Exploring What's Out There," "Paper Mountain" (deals with applications, resumes, etc.), and "The Job Interview." This workbook can be used to provide additional activities to help develop job searching skills. **(See Resource Listing for ordering information.)**

UNIT VI
LIFE SKILLS

MAJOR CONCEPT Life skills are necessary to maintain a comfortable and affordable standard of living.

TOPICS

1. personal finances
2. wages, fringe benefits, deductions
3. insurance
4. credit

OBJECTIVES

Upon completion of this unit the student will be able to:

1. define personal finances;
2. define and explain the significance of a budget;
3. correctly complete checks, deposit slips, check registers, etc.;
4. define work week, hourly rate, overtime, deductions, fringe benefits;
5. explain the reason(s) for purchasing insurance;
6. discuss the various types of insurance;
7. compare and contrast various means of obtaining housing;
8. compare and contrast various means of transportation;
9. discuss the pros and cons of using credit.

ACTIVITIES

1. Have students select a career which was researched in Unit III. Once this career has been selected, students should try to obtain information such as starting salary, hours worked per week, overtime rate for overtime hours, and fringe benefits offered by the company. Fringe benefits should include type(s) of insurance offered (company paid or employee paid) paid/non-paid vacations and holidays, sick leave, retirement plans, etc. (Also, students should try and find the cost of fringe benefits per pay period as well as the amount of taxes taken from gross pay each period. This information will be used in a later activity dealing with personal finances.) If students feel uncomfortable or run into obstacles with this activity, identify a personnel director who may be willing to provide this information. If possible, invite the personnel manager to present this information to the class. All information should be filed in the careers notebook for later use.

2. Invite a guest speaker from a bank or other financial institution to speak about the types of services offered by the institution. Topics should include checking plans, savings plans, including bonds and certificates of deposit, and costs associated with having one or more of these accounts. **(This activity will serve as a lead in to Activity 3.)**

3. Have student complete a unit on personal finances. This unit should include the development of a budget, completing checks, check stubs/registers, deposit slips, balancing a checkbook, etc. Sample materials for this exercise may be obtained from a local banking institution. Also, discuss with students how keeping accurate financial records will decrease the possibility of overspending a budget.

4. Have student compare and contrast various options for housing including buying a home, renting, and/or sharing a residence. Advertisements from the local newspaper will be very helpful with this activity.

   A way to enhance this activity is to invite a real estate agent to talk with the class about various options available for housing. The agent could help students understand costs associated with obtaining housing. Have students select the type of housing they feel would be most beneficial to them. Once this decision has been made, have students compute a monthly cost for housing. Make sure students include utilities. This information should be filed in careers notebook for use with a later activity.

5. Have students compare and contrast various options for transportation. If an individual lives in a large city there are modes of transportation other than automobile. Alternatives include subway and bus. Students should also be made aware that owning a car means other weekly or monthly expenses including gas, oil, and possibly parking fees.

6. Invite an automobile dealer to come talk with the class about purchasing a car. The dealer may be able to supply information about the various options available and the associated costs. If possible, have the dealer help students determine the cost per month for purchasing "their car." Students should file this information in their career notebooks for use with a later activity.

7. Have students summarize a presentation, by an insurance broker, about the types of insurance and how insurance impacts monthly income. Topics should include automobile, home, life, and health insurance. If it can be arranged, have the insurance broker give students the cost of insuring the car from **ACTIVITY** 6 and the housing selected in **ACTIVITY 4**. The broker should also discuss various payment schedules for insurance. Help students see that insurance serves as a protection against an unexpected loss. Students should file this information in their career notebooks for use with a later activity.

8. Have students discuss the pros and cons of credit. Help students realize that credit can be funding for items which can not be purchased under normal financial situations, but unwise use of credit can place a financial strain on a person or family.

9. Have students complete the activity entitled **"Earnings."** This activity brings together the information from activities 1-7. **(This activity is located in APPENDIX B.)** Students should build their gross income upon a forty-hour work week. This activity allows students to construct a monthly income statement detailing the monthly expenditures related to living a comfortable life. This activity should help students realize that low salary jobs may not provide enough income to sustain a comfortable life style. It will also help them to realize the need to complete high school and seriously consider postsecondary educational training.

UNIT VII
MAKING COLLEGE STUDY A REACHABLE GOAL

MAJOR CONCEPT Earning a college degree can be very costly. However, there are opportunities to help make college study a reachable goal.

TOPICS

1. scholarships
2. grants
3. apprenticeship programs
4. cooperative education opportunities
5. transfer programs
6. technical advanced placement
7. industry sponsored opportunities
8. part-time work
9. military

OBJECTIVES

Upon completion of this unit the student will be able to:

1. discuss way of financing a college education;
2. compare and contrast university transfer programs with four-year college programs;
3. explain cooperative education;
4. summarize a presentation on cooperative education;
5. discuss technical advanced placement opportunities;
6. define apprenticeship;
7. discuss the pros and cons of an apprenticeship program;
8. discuss the advantages of gaining job experience while pursuing a college education;
9. discuss the pros and cons of pursuing a college education while enlisted in the armed services;

ACTIVITIES

1. Invite the guidance counselor to make a presentation on the types of financial aid available for college education. The presentation should include grants, loans, scholarships, etc. (A packet of material, entitled "Financial Aid" is located in **APPENDIX B**. This packet was developed by Charles Lawson of Crescent High School. Much of this information is available from the South Carolina Occupational Information System. This information can be duplicated and given to students to be placed in their careers notebook.)

2. Invite the cooperative education director from a local technical college to discuss the role cooperative education can play in obtaining a college education. Ask him/her to bring information describing cooperative education and local opportunities available to students. Have students place all information in their careers notebooks.

3. Invite the human resource manager from an industry which sponsors an apprenticeship program to make a presentation about the program. Have students summarize the presentation to include the pros and cons of apprenticeship programs.

4. Invite the high school counselor to discuss opportunities for technical advanced placement. The counselor should define articulation, how to prepare in high school to achieve the most from the process, what opportunities are available at the local high school and/or career center, how to take advantage of this opportunity, and how technical advanced placement can result in lowering the cost of a college education. If the high school counselor is not comfortable with presenting the technical advanced placement program, invite the counselor from the local career center to make the presentation.

5. Invite a financial officer from a local college, two- or four-year, to discuss financing a college education. This presentation should include alternatives such as transfer programs, working while attending college (not taking a full load each term, but spreading college work over a longer period of time), work-study programs offered by the college, etc.

6. Invite an armed services recruiter to discuss ways of obtaining a college education through the military. The recruiter, if possible, should address all branches of the armed services. The representative can also discuss high school courses that should be taken in preparation for a career in the armed services.

UNIT VIII
ENTREPRENEURSHIP

MAJOR CONCEPT Many individuals prefer owning their own business rather than being an employee.

TOPICS

1. understanding entrepreneurship
2. owning a business means developing an understanding of salary schedules, work schedules, financial record keeping, federal and state tax laws, fringe benefits, etc.
3. starting a business requires financial resources
4. owning a business requires supervisory skills
5. owning a business requires careful study to determine if there is an existing market for the product to be delivered
6. earning a two-year degree in business can provide an edge in starting a company

OBJECTIVES

Upon completion of this unit the student will be able to:

1. define entrepreneurship;
2. discuss the pros and cons of entrepreneurship;
3. interview an owner of a business; summarize the interview and report the findings to the class;
4. summarize a presentation made by a bank official about securing funds to finance a business;
5. discuss supervisory skills;
6. identify sources of information concerning starting a business;
7. discuss the advantages of a two-year degree in business on starting a company.

ACTIVITIES

1. Have students research the concept of entrepreneurship and make presentations to the class. This activity could serve as a group exercise giving students the opportunity to work together to solve a problem.

2. Have student complete the activity "Entrepreneur Survey." This activity allows students to interview an individual who owns a business. (Some of the background information can be found on SCOIS.) Once the questionnaire has been completed, have students present findings to the class. Written summaries can be provided for students to place in their careers notebooks. (Remind students to inform the person being interviewed this is part of a class assignment and to schedule the interview at the owner's convenience.)

3. Group students and have each group write a state agency to obtain information regarding rules and regulations for starting a small business. (A copy of the booklet **"Fact Sheet for Starting a Small Business"** (See **APPENDIX B**) gives the addresses of agencies which can be contacted.) Each group should present its findings to the class. The class can compile a composite report which can be placed on file in the library or guidance office for other students to reference.

4. Invite a member of the Chamber of Commerce to come talk about local requirements for starting a small business. Before the speaker comes, students should compile a list of questions to be answered during the presentation. Ask the speaker to bring information about small businesses. Have student place this information in their careers notebook

5. Have students complete the **"Some Points to Consider Before Starting Your Business"** survey located in **APPENDIX B**. This provides students an opportunity to answer questions regarding starting a small business.

6. Lead students through a discussion of the **"Summary of Loan Application"** activity. (**See APPENDIX B** for a copy **of the document.**) This activity outlines the process for completing a loan application for starting a small business and the types of information required before the application can be processed.

UNIT IX
STUDY SKILLS

MAJOR CONCEPT Proper study and time management skills can increase a student's performance in the classroom.

TOPICS

1. study skills involve more than just reading materials and completing homework assignments
2. preparing and following a daily schedule can help focus attention on required studying
3. a student's attitude impacts academic success
4. being academically successful is the responsibility of the student
5. learning styles govern study habits

OBJECTIVES

Upon completion of this unit the student will be able to:

1. keep a weekly log of activities to determine areas of weaknesses in study habits;
2. analyze weekly logs of activities to determine areas that can be improved;
3. design a weekly study schedule;
4. complete a survey concerning study skills and study habits;
5. complete additional activities in learning how to learn;
6. analyze a learning style survey and determine his learning style.

ACTIVITIES

1. Have students complete the activity "Are You In Control?" The video, Study Skills: How to Manage Your Time, is an excellent way to introduce this activity. (This video is located in the Learning Resource Center at Tri-County Technical College and is available for teachers to check out.) In this activity students will analyze their study skills. The suggestions for managing time will give students an opportunity to start thinking about ways to improve their study skills. (A copy of the activity can be found in APPENDIX B.)

2. Have students complete a learning style questionnaire. Discuss the various learning styles and how styles affect ability to learn. (A questionnaire, consistency key, and learning style profile are located in APPENDIX B.)

3. Have students begin keeping a log of their daily routines to determine how days are spent. This log should be reviewed and discussed weekly to give students an opportunity to focus on daily activities and the need to set up a time schedule for studying. (A sample log, entitled, "Weekly Activity Log," is located in APPENDIX B. This sheet should be given to students for use during this activity. Make sure students understand the first few logs will be used for analysis purposes only. All logs should be filed in the careers notebook.)

4. Have students design a schedule to organize daily activities. Students should make notations on the schedule when it is altered. Weekly reviews should be conducted to provide students with an opportunity to develop a schedule they can use each week. Students may need to adjust their schedules several times during the year as activities (i.e. basketball, baseball, etc.) are added to or removed from daily routines. (Students can use the "Weekly Activity Log" sheet to complete this activity.)

5. The book GETTING SMARTER: Simple Strategies to Get Better Grades is an excellent source of activities on improving study skills. The activities in this book can be reproduced for "noncommercial classroom use." Chapters include "Getting Organized," Scheduling Your Time," (which can be used with activities 3 and 4) and "Taking Notes." (See Resource Listing for ordering information.)

RESOURCES FOR INTRODUCTION TO TECHNOLOGIES

UNIT I--THE CHANGING WORLD OF WORK

*South Carolina Employment Security Commission. South Carolina Labor Market Review, Columbia, SC. August 1989

*South Carolina Employment Security Commission. South Carolina Employment Trends, Columbia, SC. August 1989

*South Carolina Employment Security Commission. South Carolina: Job Search Assistance Guide, Columbia, SC. February 1989

**Campbell, Richard and Thompson, Mary J. WORKING: Today and Tomorrow. St. Paul, MN: EMC Publishing

**Abram, Robert E.; Covert, Barbara; and Kitchen, Kate. Transferable Skills. Columbus, OH: The National Center for Research in Vocational Education

**Krannich, Ronald L. Careering and Re-Careering for the 1990's: The Complete Guide to Planning Your Future. Manassas, VA: Impact Publications

***Dealy, William J. Keynote Address 1989 Annual Conference of the Personnel and Training Associations of Anderson, Oconee, and Pickens Counties, South Carolina, August, 1989

*This material can be obtained from the South Carolina Employment Security Commission, Labor Market Information Division, 1550 Gadsden Street, P. O. Box 995, Columbia, SC 29202.

**This material is located in the PACE office and can be checked out by teachers.

***A copy of this presentation is located in **APPENDIX C.**

RESOURCES FOR INTRODUCTION TO TECHNOLOGIES

UNIT II--PERSONAL INVENTORY

*Ohme, Herman. Learn How to Learn. Los Altos, CA: California Education Plan

*Greene, Lawrence and Jones-Bamman, Leigh. Getting Smarter. Belmont, CA: David S. Lake Publishers

*Jensen, Eric. Student Success Secrets. New York, NY: Barron's Educational Series, Inc.

*McGinnis, Alan Loy. CONFIDENCE: How to Succeed at Being Yourself. Minneapolis, MN: Augsburg Publishing House

*Brewner, Margaret, et. al. Attitudes on the Job. New York, NY: Educational Design, Inc.

**Cottle, William C. School Interest Inventory. Chicago, IL: Riverside Publishing Company

***Teal, Jack D. and Hartwig, Daryl. Career Compass. Bloomington, IL: Meridan Education Corporation

*This material is located in the PACE office and can be checked out by teachers.

**The prices for ordering the School Interest Inventory are

100 test booklets	$66.00	(Code # 9-62335)
Examiner's Manual	4.50	(Code # 9-62332)
Scoring Masks	6.60	(Code # 9-62333)

The address is
Riverside Publishing Company
8420 Bryn Mawr Avenue
Chicago, Illinois 60631
800/323-9540

***The Career Compass can be ordered from:

Meridan Education Corporation
205 East Locust Street
Bloomington, IL 61701

The cost of the program is $90 and is available for use with IBM, TRS-80 or APPLE computers.

RESOURCES FOR INTRODUCTION TO TECHNOLOGIES

UNIT III--MID-LEVEL TECHNOLOGY CAREERS

*Dealy, William A. Keynote Address 1989 Annual Conference of the Personnel and Training Associations of Anderson, Oconee, and Pickens Counties, South Carolina. Tri-County Technical College, August 1989

*Partnership for Academic and Career Education. A Guide to Area Business Speakers: A Resource for Teachers and Counselors. Pendleton, SC: Tri-County Technical College

*U. S. Department of Labor. The Southeast's 21st Challenge. Atlanta, GA: U. S. Department of Labor

*Guidance Associates. Careers in Health Services: Opportunities for You. Mount Kisco, NY

**Fales, James F.; Kuetemeyer, Vincent F.; and Brusic, Sharon. Technology Today and Tomorrow. Mission Hills, CA: Glencoe Publishing Company

**Krannich, Ronald L. Careering and Re-Careering for the 1990's: The Complete Guide to Planning Your Future. Manassas, VA: Impact Publications

/*Hull, Daniel M. and Prescott, Carolyn A. High-Technology Careers: A Guide for Counselors. Waco, TX: Center for Occupational Research and Development

**Southworth, Scott. Exploring High Tech Careers. New York, NY: Rosen Publishing Group

**Campbell, Richard and Thompson, Mary J. WORKING: Today and Tomorrow. St. Paul, MN: EMC Publishing

*A copy of this publication is located in **APPENDIX C.**

**This material is located in the PACE office and can be checked out by teachers. Also, the Technology Today and Tomorrow textbook is on the list of state adopted textbooks. Teachers may be able to get a set of teacher's materials from the company.

***Check with the guidance counselor to see if a copy of this book is in the guidance office.

RESOURCES FOR INTRODUCTION TO TECHNOLOGIES

UNIT IV--SELF-ESTEEM

*McGinnis, Alan Loy. CONFIDENCE: How to Succeed at Being Yourself. Minneapolis, MN: Augsburg Publishing House

*Newman, Mildred and Berkowitz, Bernard. How to Be Your Own Best Friend. New York, NY: Random House, Inc.

*Clark, Aminah, Clemes, Harris, and Bean, Reynold. How To Raise Teenagers' Self-Esteem. Los Angeles, CA: Price Stern Sloan, Inc.

*Maiorana, Victor P. How to Learn and Study in College. Englewood Cliffs, NJ: Prentice-Hall, Inc.

*Palmer, Pat. TEEM ESTEEM: A Self-Direction Manual for Young Adults. San Luis Obispo, CA: Impact Publishers

**Rowe, John R., Pasch, Marvin, and Hamilton, William F. The New Model Me. New York, NY: Teachers College Press

*This material is located in the PACE office and can be checked out by teachers.

**The New Model Me is a curriculum within itself. This material is designed to help students look at their behaviors and how these behaviors affect others. Several school districts are using this as a semester course. However, the activities in this curriculum can be used to help enhance self-esteem. The teacher's edition of the book, which includes a copy of the student text, can be purchased for $13.95 (plus shipping and handling). Your local bookstore should be able to get the book. However, if the bookstore cannot order the book, you can order the book from

Teachers College Press
P. O. Box 939
Wolfeboro, NH 03894

ISBN 0-8077-2733-4

RESOURCES FOR INTRODUCTION TO TECHNOLOGIES

UNIT V--JOB SEARCHING SKILLS

*Partnership for Academic and Career Education. A Guide to Area Business Speakers: A Resource for Teachers and Counselors. Pendleton, SC: Tri-County Technical College

**Krannich, Ronald L. Careering and Re-Careering for the 1990's: The Complete Guide to Planning Your Future. Manassas, VA: Impact Publications

/**Kimeldorf, Martin. Job Search Education. New York, NY: Educational Design, Inc.

/**Brewner, Margaret M., et al. Attitudes on the Job. New York, NY: Educational Design, Inc.

***Chapman, Elwood C., The Fifty Minute Career Discovery Program. Los Altos, CA: Crisp Publications, Inc.

*A copy of this publication is located in **APPENDIX C**.

**This material is located in the PACE office and can be checked out by teachers.

***A copy of this book should be located either in your library or in the guidance office.

****This workbook can be purchased from:

Educational Design, Inc.
47 West 13 Street
New York, NY 10011

RESOURCES FOR INTRODUCTION TO TECHNOLOGIES

UNIT VI--LIFE SKILLS

*Partnership for Academic and Career Education. A Guide to Area Business Speakers: A Resource for Teachers and Counselors. Pendleton, SC. Tri-County Technical College

**Campbell, Richard and Thompson, Mary J. WORKING: Today and Tomorrow. St. Paul, MN: EMC Publishing

*A copy of this book is found in **APPENDIX C**.

**This material is located in the PACE office and can be checked out by teachers.

RESOURCES FOR INTRODUCTION TO TECHNOLOGIES

UNIT VII--MAKING COLLEGE STUDY A REACHABLE GOAL

*Campbell, Richard and Thompson, Mary J. WORKING: Today and Tomorrow. St. Paul, MN: EMC Publishing

U.S. Department of Education. Federal Student Aid Fact Sheet. Office of Financial Assistance, Washington, D.C. 20202-5464

Consumer Information Center. Formula Book. Department M-11, Pueblo, CO 81009-0015 1-800-333-4636

Tri-County Technical College. Student Financial Aid. Pendleton, SC: Tri-County Technical College

College Board. College Cost Book. New York, NY: College Board Publications

South Carolina Commission on Higher Education, IBM Building, 1333 Main Street, Suite 650, Columbia, SC 29201

*This material is located in the PACE office and can be checked out by teachers.

NOTE: The financial aid office of local colleges can provide information related to sources of funding for a college education.

RESOURCES FOR INTRODUCTION TO TECHNOLOGIES

UNIT VIII--ENTREPRENEURSHIP

Small Business Development Center of Clemson, Clemson University Regional Office, 425 Sirrine Hall, Clemson University, Clemson, SC 29634-1301 (803) 656-3227

Small Business Association Form 1158. U.S. Government Printing Office, Division of Public Documents, Washington, DC 20402 (202) 783-3238

*Baumback, Clifford M. How to Organize and Operate a Small Business. Englewood Cliffs, NJ: Prentice-Hall, Inc.

**Small Business Reporter. Bank of America, Department 3120, P. O. Box 37000, San Francisco, CA 94137 (415) 622-2491

Karnoff, Bernard. Small Time Operator. Laytonville, CA: Bell Springs Publishing Company

Local Chamber of Commerce

*This material is located in the PACE office and can be checked out by teachers.

**A copy of this publication is located in APPENDIX C.

RESOURCES FOR INTRODUCTION TO TECHNOLOGIES

UNIT IX--STUDY SKILLS

*Knipe, Wayne. Better Grades Easier. Dallas, TX: Taylor Publishing Company

*Jensen, Eric. Student Success Secrets. New York, NY: Barron's Educational Series, Inc.

*Greene, Lawrence and Jones-Bamman, Leigh. GETTING SMARTER: Simple Strategies to Get Better Grades. Belmont, CA: David S. Lake Publishers

*Ohme, Herman. Learn How to Learn. Los Altos, CA: California Education Plan

**Guidance Associates. Study Skills: How to Manage Your Time. Mount Kisco, NY

*This material is located in the PACE office and can be checked out by teachers.

**This video is located in the Learning Resources Center on the campus of Tri-County Technical College and can be checked out by teachers.

SUPPORT ACTIVITIES FOR INTRODUCTION TO TECHNOLOGIES

The following is a list of support activities and informative handouts that accompany **Introduction to Technologies**. These activities and handouts were designed to enhance participants' understanding of pertinent information. (These materials were not included in the syllabus because of the bulk of material already provided.)

I. **The Changing World of Work**
   - a. Career Opportunities minichart
   - b. Fastest Growing Jobs in the Southeast handout
   - c. U.S. Dept. of Labor GED Skill Level Definitions
   - d. Job ads collage for mid-level technology jobs in the Upstate
   - e. "Researching a Career" activity
   - f. "Career Cards" activity
   - g. "Employee Interview" activity

II. **Personal Inventory**
   - a. Career Profile activity
   - b. Study Habits activity
   - c. "Into the Future" activity

III. **Mid-level Technology Careers**
   - a. "Researching a Career" activity

IV. **Self-Esteem**
   - a. "Are you being manipulated?" activity
   - b. Manipulation exercises 1,2, and 3

V. **Job Searching Skills**
   - a. Sample 1--employment application
   - b. Sample 2--employment application
   - c. Sample 3--employment application
   - d. Sample 4--employment application

VI. **Life Skills**
   - a. Budget activity

VII. **Financing a College Education**
   - a. SCOIS Financial Aid index and information
   - b. 1990-91 Federal Student Aid Fact Sheet
   - c. College Scholarship Service Financial Aid Form--1990
   - d. 1990-91 South Carolina Tuition Grant Application

VIII. **Entrepreneurship**
   a. Entrepreneur Survey
   b. Fact Sheet for Starting a Small Business
   c. Greenville Chamber of Commerce Small Business information
   d. Loan information
   e. Business plan
   f. Information about the business
   g. Market analysis
   h. Market strategy
   i. Financial analysis
   j. Owner's self-assessment

IX. **Study Skills**
   a. "Are you in control?" activity
   b. "How to manage your time" handout
   c. Learning style questionnaire
   d. "Helping Students Determine their Learning Style" handout
   e. Learning Style profile
   f. Weekly Activity Log

SUPPORT MATERIALS FOR INTRODUCTION TO TECHNOLOGIES

The following is a list of support materials which accompany **Introduction to Technologies**. These materials were provided to teachers to aid in enhancing their understanding of pertinent issues and information. (These materials were not included in this syllabus because of the bulk of material already provided).

1. **Guide to Area Business Speakers**, published by PACE office, Feb. 1990.

2. Keynote Address, 1989 Annual Conference of the Personnel and Training Association of Anderson, Oconee, and Pickens Counties, SC. Given by William A. Dealy, Jr., Regional Management Analyst and Coordinator for Research, Demonstrations, and Evaluations, U.S. Department of Labor, Employment and Training Administration, Region IV, Atlanta, GA.

3. **The Southeast's 21st Challenge--The Need to Build a Quality Workforce**, published jointly by Southeast Regional offices of the U.S. Department of Labor, U.S. Department of Education, U.S. Office of Personnel Management, U.S. Department of Health and Human Services.

4. **Small Business Reporter--Steps to Starting a Business**, published by Bank of America.

5. **Changing America: The New Face of Science and Engineering.** Interim Report, The Task Force on Women, Minorities, and the Handicapped in Science and Technology.

6. "Activities to Help Students Explore Technology Careers," published by the PACE office.

7. "Sample Entry-Level Positions and Starting Salaries of Tri-County Technical College Graduates, 1989," published by Tri-County Technical College.

8. "Educating for Our Factories of the Future," by Stuart A. Rosenfeld, Director of the Southern Technology Council and Deputy Director of the Southern Growth Policies Board, **Education Week**, June 22, 1988.

9. "The New, Improved Vocational School," by Nancy J. Perry, **Fortune**, June 19, 1989.

10. "We Have a Problem," by Jane Marks, **Parents Magazine**, November 1987.

11. "My Son Needed to Feel Needed," by Margaret White, **Parents Magazine**, April 1989.

12. "The Need for Blending Academic and Vocational Studies," published by the PACE office.

13. "Procedures for Obtaining SBA Loans," published by the Clemson University Extension Service.

14. "City of Greenville Business Requirements," published by the City of Greenville, SC.

MATHEMATICS FOR THE WORKPLACE

APPLICATIONS FROM ENGINEERING TECHNOLOGY

(Clark-Schwebel Industries)

A TEACHER'S GUIDE

Developed by:

Johnny M. Wallace and **Cheryl Carson**

Associate Director / Curriculum Developer
Partnership for Academic and Career Education

Graduate Student
Clemson University
Intern - Clark Schwebel

(December 1990)

Partnership for Academic and Career Education (PACE)
P. O. Box 587
Pendleton, SC 29670
(803-646-8361, ext. 2247)

BEST COPY AVAILABLE

Activities of the Partnership for Academic and Career Education are supported primarily by funds awarded through the U.S. Department of Education, Fund for the Improvement of Postsecondary Education (FIPSE) and the S.C. Department of Education/Office of Vocational Education's Carl Perkins Sex Equity Program. However, the opinions and information presented in this material do not necessarily reflect the positions or policies of these entities, and no official endorsement by them should be inferred.

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INTRODUCTION

The workplace of tomorrow will require a level of skills beyond the twelfth grade. Technological advances have necessitated higher levels of mathematics skills for employees to function efficiently in the workplace because employers need workers who can make calculations quickly and correctly.

Because of increased emphasis on higher levels of mathematics skills, teachers must ensure a strong relationship between what they teach in the classroom and what transpires in the real world. Unless students see the relationship between what is taught and what is important in real life, they may not be motivated to take their mathematics studies seriously and may not take courses which will challenge them as learners and thus not become proficient in the use of mathematics.

Examples from real-life settings often help students better understand the need to study and learn mathematics skills taught in the classroom. Real-life applications can provide the needed relevance to motivate students, not only to apply themselves to their studies, but also to take the highest level of mathematics they are capable of handling successfully. **Mathematics for the Workplace: Applications from Engineering Technology** is designed to present a real-world context where mathematics skills are used as part of a daily routine. The context for this module is the industrial and engineering technology area.

One intent of **Mathematics for the Workplace: Applications from Engineering Technology** is to help students understand the significance of mathematics skills in performing daily tasks. An additional purpose is to help students see the need for being precise and accurate when completing tasks which are part of job requirements.

HOW TO USE THIS MODULE

The table of contents in this packet lists the materials encompassed within the module. **This is a teacher's guide, not a packet of materials designed entirely to be duplicated and presented to students.** There are, however, several sections which should be duplicated and given to students so they can complete the assigned tasks.

Pages 3-5 give the students an introduction to engineering technology. Included in this section is such information as types of engineering technicians, duties of technicians, high school preparation, sources of additional information and earnings and advancement opportunities. **These pages can be duplicated and given to students as introductory information.**

Page 6 gives an explanation of the task and the need for the task. **This page can be duplicated and given to students as information.**

Pages 7-8 give an explanation of the handout and the questions to be answered to complete the lesson. **These pages should be duplicated and given to students.**

Pages 9-25 are the answer keys to the questions. The answer key gives the solutions to each question. Many of the problems can be solved using one or more methods. In the case of more than one method, each method is presented in each question.

Appendix A contains the handout required to complete the lesson. Also, the teacher's answer key for the handout is in Appendix A.

EXAMINING THE PROFESSION: Engineering Technician

Engineering technicians apply theorems and postulates of science, mathematics, and engineering to solve problems in areas such as manufacturing, research and development and customer services. Most technicians work as assistants to scientists and engineers. Technicians can specialize in several areas. Included in these areas are

- electrical technicians who apply electrical theory and knowledge to examine and alter electrical machinery and control equipment in industrial plants;
- electronics technicians who apply electronic theory and related knowledge to lay out, build, troubleshoot, repair and modify the production of electronic equipment;
- mechanical engineering technicians who develop and test machinery and equipment using theories related to mechanical engineering; and
- industrial engineering technicians who examine production, maintenance, and other work operations to establish standard production output.

DUTIES OF TECHNICIANS

Technicians perform a range of duties, depending on the area in which they gain expertise. Duties include

- building or setting up equipment,
- making prototype versions of equipment designs,
- testing prototypes to ensure quality,
- serving as field representatives,
- writing manuals, and
- testing products for production quality.

WORKING CONDITIONS

Most technicians work an 8-hour day, 40-hour work week. Technicians may work in research and development laboratories, industrial or manufacturing plants, or electronics shops.

HIGH SCHOOL PREPARATION

In order to be best prepared for a program of studies in engineering technology, students in high school should take algebra, geometry, chemistry, and physics courses. Occupational related courses such as electronics/electricity and industrial maintenance or mechanics will provide a base of technical skills for persons entering technician careers.

Opportunities to gain experience in engineering technology can be obtained through apprenticeship programs.

ADDITIONAL INFORMATION

Many employers prefer to hire technicians with technical training or college courses in the areas of science, engineering, and mathematics. Some technician positions require specialized training and experience.

Engineering technology programs are offered at the following two-year colleges. Listed with each college is a contact person for engineering technician programs.

Greenville Technical College
Contact: Eugene Yedinak
Dean of Engineering Technologies
Greenville Technical College
P. O. Box 5616
Station B
Greenville, SC 29606

Spartanburg Technical College
Contact: Kemp I. Sigmon
Dean of Industrial Division
Spartanburg Technical College
P. O. Box 4386
Spartanburg, SC 29305

Piedmont Technical College
Contact: Gerald R. Owens
Dean of Engineering
and Industrial
Technology
Piedmont Technical College
Drawer 1476
Greenwood, SC 29648

Tri-County Technical College
Contact: Dr. James Wood
Chairman of Industrial
and Engineering
Technology
Tri-County Technical
College
P. O. Box 587
Pendleton, SC 29670

EARNINGS AND ADVANCEMENTS

In South Carolina in 1988, engineering technicians earned between $14,000 and $29,000. Earnings vary, depending on the level of education and experience.

Technicians advance as they gain on-the-job experience and additional special training. Technicians move from routine work to assignments of increasing difficulty. Some technicians become supervisors or engineers if they receive additional formalized training.

INTRODUCTION TO THE TASK

Kevlar®, a synthetic fiber of extraordinary strength, is manufactured by Clark-Schwebel Industries. Kevlar® is used in the manufacture of products such as helmets, ships, helicopter blades and chaps in leg coverings for loggers. Because it contracts when heated, Kevlar® is also used in the production of circuit boards for electronic equipment.

One of the biggest uses of Kevlar® is in the production of bullet proof vests. Because of the strength of this light-weight material, only a few plies of the material are sewn together to make a vest. The number of plies used in the construction of the vest may vary from eight to fifteen.

One task a technician performs is that of testing the Kevlar® to determine its quality. One such test is a ballistics test. In a ballistics test, the technician takes a certain number of plies of Kevlar®, such as the number used in a bullet proof vest, and binds them together.

Once these plies have been bound, a projectile, which represents a bullet, is fired into the sample. The number of projectiles used in the test may range from six to twenty. The projectile has a certain weight and is fired from a specific caliber weapon, such as a 22-caliber rifle.

Once the projectiles have been fired into the material, the technician makes a determination as to whether or not the hole made by the projectile is a "complete" or a "partial." A complete is one which allows light to pass through the material, and a partial is one in which the projectile penetrated but did not pass through the material. Many times the partial projectiles are lodged in the material.

After classifying each hit as a partial or a complete, the technician randomly selects a sample of hits. Fifty percent of the hits are completes and fifty percent are partials. Once the samples have been selected, the technician must perform various mathematical calculations to determine if the Kevlar® is of proper quality.

UNDERSTANDING THE DATA

Handout 1 shows various information used in analyzing the results of the ballistics limit test on a sample of Kevlar®. (Because of needed security, information pertaining to certain specifics, such as type and weight of projectile, has been deleted.)

In the section entitled SAMPLE, size refers to the dimensions of the sample of material; number of plies is how many were put together for the test; and sample weight gives the weight of the completed sample used in the test.

The BALLISTIC THREAT section gives information on the type (Caliber) of the projectile, how much the projectile weighed, the length of the barrel and the angle at which the projectile was fired at the target (obliquity).

The RANGE section gives information telling the distance from the muzzle to the witness. Screens 1 and 2, or chronographs 1 and 2, are used as reference points in calculating the speed of the projectile along the projectile's path.

ANALYZING THE RESULTS

The following questions are to be used in analyzing the information on HANDOUT 1, the Ballistic Limit Test.

1. Compute the velocity of each projectile used in the V50 test at chronograph 1 and chronograph 2.

2. Compute the average velocity and striking velocity for each projectile used in the test.

3. Compute the overall average velocity for the test.

4. What is the "high partial" velocity of the ten projectiles used in the test? The "low complete" velocity?

5. What is the range of results for the test? What is the range of mixed results (highest partial to lowest complete)?

6. In order to determine if the material is of top quality, the company sets minimum standards for control. In this specific test, the material is top quality if the overall average velocity for the test is no greater than the sum of a minimum preset velocity and the range of results. If the minimum preset velocity for this test is 1200 ft/sec, is this lot acceptable? Please explain your answer.

NOTE: The shots used in the final analysis of the test are denoted by an asterisk in the "Include in V50" column. Since the technician is only concerned about these shots, required information will only be computed for these shots.

To compute the velocity at chronograph 1 and chronograph 2, a proportion can be used. However, the travel time between each check point is written in scientific notation with negative exponents. Therefore, the time must be converted to non-scientific notation form before any calculations can be made.

ANSWER KEY

QUESTION 1

Shot 1 (Chronograph 1)

The time required to travel five feet, the distance from the muzzle to chronograph 1, is 361.4 X 10-5 or .003614 seconds. The distance from the muzzle to chronograph 1 is five feet. Using a proportion, we can compute the velocity in feet per second. If the projectile travels five feet in .003614 seconds, how far will it travel in 1 second?

The proportion is

$$\frac{.003614 \text{ seconds}}{\text{five feet}} = \frac{1 \text{ second}}{x \text{ feet}}.$$

Cross multiplication gives

$$.003614x \text{ feet-seconds} = 5 \text{ feet-seconds}.$$

Solving for 'x' we get

$$x \text{ feet} = \frac{5 \text{ feet-seconds}}{.003614 \text{ seconds}}$$

or

$$x = 1384 \text{ feet}.$$

Shot 1 (Chronograph 2)

The distance from chronograph 1 to chronograph 2 is also five feet. The time required for the projectile to travel from chronograph 1 to chronograph 2 is 362.4 X 10-5 seconds or .003624 seconds. Using a proportion, we calculate the velocity in feet per second as

$$\frac{.003624 \text{ seconds}}{5 \text{ feet}} = \frac{1 \text{ second}}{x \text{ feet}}.$$

Cross multiplying we get

$$.003624x \text{ feet-seconds} = 5 \text{ feet-seconds}.$$

Solving for 'x' we get

$$x \text{ feet} = \frac{5 \text{ feet-seconds}}{.003624 \text{ seconds}}$$

or

$$x = 1380 \text{ feet}.$$

Shot 3 (Chronograph 1)

The time required to travel five feet, the distance from the muzzle to chronograph 1, is 382.0 X 10-5 or .00382 seconds. The distance from the muzzle to chronograph 1 is five feet. Using a proportion, we can compute the velocity in feet per second. If the projectile travels five feet in .003614 seconds, how far will it travel in 1 second?

The proportion is

$$\frac{.00382 \text{ seconds}}{5 \text{ feet}} = \frac{1 \text{ second}}{x \text{ feet}}.$$

Cross multiplication gives

$$.00382x \text{ feet-seconds} = 5 \text{ feet-seconds}.$$

Solving for 'x' we get

$$x \text{ feet} = \frac{5 \text{ feet-seconds}}{.00382 \text{ seconds}}$$

or

$$x = 1309 \text{ feet}.$$

Shot 3 (Chronograph 2)

The distance from chronograph 1 to chronograph 2 is also five feet. The time required for the projectile to travel from chronograph 1 to chronograph 2 is 382.8 X 10-5 seconds or .003828 seconds. Using a proportion, we calculate the velocity in feet per second as

$$\frac{.003828 \text{ seconds}}{5 \text{ feet}} = \frac{1 \text{ second}}{x \text{ feet}}.$$

Cross multiplying we get

$$.003828x \text{ feet-seconds} = 5 \text{ feet-seconds}.$$

Solving for 'x' we get

$$x \text{ feet} = \frac{5 \text{ feet-seconds}}{.003828 \text{ seconds}}$$

or

$$x = 1306 \text{ feet}.$$

Shot 5 (Chronograph 1)

The time required to travel five feet, the distance from the muzzle to chronograph 1, is 398.8 X 10-5 or .003988 seconds. The distance from the muzzle to chronograph 1 is five feet. Using a proportion, we can compute the velocity in feet per second. If the projectile travels five feet in .003988 seconds, how far will it travel in 1 second?

The proportion is

$$\frac{.003988 \text{ seconds}}{5 \text{ feet}} = \frac{1 \text{ second}}{x \text{ feet}}.$$

Cross multiplication gives

$$.003988x \text{ feet-seconds} = 5 \text{ feet-second}.$$

Solving for 'x' we get

$$x \text{ feet} = \frac{5 \text{ feet-seconds}}{.003988 \text{ seconds}}$$

or

$$x = 1254 \text{ feet}.$$

Shot 5 (Chronograph 2)

The distance from chronograph 1 to chronograph 2 is also five feet. The time required for the projectile to travel from chronograph 1 to chronograph 2 is 399.6 X 10-5 seconds or .003996 seconds. Using a proportion, we calculate the velocity in feet per second as

$$\frac{.003996 \text{ seconds}}{5 \text{ feet}} = \frac{1 \text{ second}}{x \text{ feet}}.$$

Cross multiplying we get

$$.003996x \text{ feet-seconds} = 5 \text{ feet-seconds}.$$

Solving for 'x' we get

$$x \text{ feet} = \frac{5 \text{ feet-seconds}}{.003996 \text{ seconds}}$$

or

$$x = 1251 \text{ feet}.$$

Shot 12 (Chronograph 1)

The time required to travel five feet, the distance from the muzzle to chronograph 1, is 375.1 X 10-5 or .003751 seconds. The distance from the muzzle to chronograph 1 is five feet. Using a proportion, we can compute the velocity in feet per second. If the projectile travels five feet in .003751 seconds, how far will it travel in 1 second?

The proportion is

$$\frac{.003751\text{ seconds}}{5\text{ feet}} = \frac{1\text{ second}}{x\text{ feet}}.$$

Cross multiplication gives

$$.003751x\text{ feet-seconds} = 5\text{ feet-seconds}.$$

Solving for 'x' we get

$$x\text{ feet} = \frac{5\text{ feet-seconds}}{.003751\text{ seconds}}$$

or

$$x = 1333\text{ feet}.$$

Shot 12 (Chronograph 2)

The distance from chronograph 1 to chronograph 2 is also five feet. The time required for the projectile to travel from chronograph 1 to chronograph 2 is 376.1 X 10-5 seconds or .003761 seconds. Using a proportion, we calculate the velocity in feet per second as

$$\frac{.003761\text{ seconds}}{5\text{ feet}} = \frac{1\text{ second}}{x\text{ feet}}.$$

Cross multiplying we get

$$.003761x\text{ feet-seconds} = 5\text{ feet-seconds}.$$

Solving for 'x' we get

$$x\text{ feet} = \frac{5\text{ feet-seconds}}{.003761\text{ seconds}}$$

or

$$x = 1329\text{ feet}.$$

Shot 13 (Chronograph 1)

The time required to travel five feet, the distance from the muzzle to chronograph 1, is 369.0 X 10-5 or .00369 seconds. The distance from the muzzle to chronograph 1 is five feet. Using a proportion, we can compute the velocity in feet per second. If the projectile travels five feet in .00369 seconds, how far will it travel in 1 second?

The proportion is

$$\frac{.00369 \text{ seconds}}{5 \text{ feet}} = \frac{1 \text{ second}}{x \text{ feet}}.$$

Cross multiplication gives

$$.00369x \text{ feet-seconds} = 5 \text{ feet-seconds}.$$

Solving for 'x' we get

$$x \text{ feet} = \frac{5 \text{ feet-seconds}}{.00369 \text{ seconds}}$$

or

$$x = 1355 \text{ feet}.$$

Shot 13 (Chronograph 2)

The distance from chronograph 1 to chronograph 2 is also five feet. The time required for the projectile to travel from chronograph 1 to chronograph 2 is 370.0 X 10-5 seconds or .0037 seconds. Using a proportion, we calculate the velocity in feet per second as

$$\frac{.0037 \text{ seconds}}{5 \text{ feet}} = \frac{1 \text{ second}}{x \text{ feet}}.$$

Cross multiplying we get

$$.0037x \text{ feet-seconds} = 5 \text{ feet-seconds}.$$

Solving for 'x' we get

$$x \text{ feet} = \frac{5 \text{ feet-seconds}}{.0037 \text{ seconds}}$$

or

$$x = 1351 \text{ feet}.$$

Shot 14 (Chronograph 1)

The time required to travel five feet, the distance from the muzzle to chronograph 1, is 369.3 X 10-5 or .003693 seconds. The distance from the muzzle to chronograph 1 is five feet. Using a proportion, we can compute the velocity in feet per second. If the projectile travels five feet in .003693 seconds, how far will it travel in 1 second?

The proportion is

$$\frac{.003693 \text{ seconds}}{5 \text{ feet}} = \frac{1 \text{ second}}{x \text{ feet}}.$$

Cross multiplication gives

$$.003693x \text{ feet-seconds} = 5 \text{ feet-seconds}.$$

Solving for 'x' we get

$$x \text{ feet} = \frac{5 \text{ feet-seconds}}{.003693 \text{ seconds}}$$

or

1354 feet.

Shot 14 (Chronograph 2)

The distance from chronograph 1 to chronograph 2 is also five feet. The time required for the projectile to travel from chronograph 1 to chronograph 2 is 370.0 X 10-5 seconds or .0037 seconds. Using a proportion, we calculate the velocity in feet per second as

$$\frac{.0037 \text{ seconds}}{5 \text{ feet}} = \frac{1 \text{ second}}{x \text{ feet}}.$$

Cross multiplying we get

$$.0037x \text{ feet-seconds} = 5 \text{ feet-seconds}.$$

Solving for 'x' we get

$$x \text{ feet} = \frac{5 \text{ feet-seconds}}{.0037 \text{ seconds}}$$

or

$x = 1351$ feet.

Shot 15 (Chronograph 1)

The time required to travel five feet, the distance from the muzzle to chronograph 1, is 363.7 X 10-5 or .003637 seconds. The distance from the muzzle to chronograph 1 is five feet. Using a proportion, we can compute the velocity in feet per second. If the projectile travels five feet in .003637 seconds, how far will it travel in 1 second?

The proportion is

$$\frac{.003637 \text{ seconds}}{5 \text{ feet}} = \frac{1 \text{ second}}{x \text{ feet}}.$$

Cross multiplication gives

$$.003637x \text{ feet-seconds} = 5 \text{ feet-seconds}.$$

Solving for 'x' we get

$$x \text{ feet} = \frac{5 \text{ feet-seconds}}{.003637 \text{ seconds}}$$

or

$$x = 1375 \text{ feet}.$$

Shot 15 (Chronograph 2)

The distance from chronograph 1 to chronograph 2 is also five feet. The time required for the projectile to travel from chronograph 1 to chronograph 2 is 364.7 X 10-5 seconds or .003647 seconds. Using a proportion, we calculate the velocity in feet per second as

$$\frac{.003647 \text{ seconds}}{5 \text{ feet}} = \frac{1 \text{ second}}{x \text{ feet}}.$$

Cross multiplying we get

$$.003647x \text{ feet-seconds} = 5 \text{ feet-seconds}.$$

Solving for 'x' we get

$$x \text{ feet} = \frac{5 \text{ feet-seconds}}{.003647 \text{ seconds}}$$

or

$$x = 1371 \text{ feet}.$$

Shot 17 (Chronograph 1)

The time required to travel five feet, the distance from the muzzle to chronograph 1, is 370.8 X 10-5 or .003708 seconds. The distance from the muzzle to chronograph 1 is five feet. Using a proportion, we can compute the velocity in feet per second. If the projectile travels five feet in .003708 seconds, how far will it travel in 1 second?

The proportion is

$$\frac{.003708 \text{ seconds}}{5 \text{ feet}} = \frac{1 \text{ second}}{x \text{ feet}}.$$

Cross multiplication gives

$$.003708x \text{ feet-seconds} = 5 \text{ feet-seconds}.$$

Solving for 'x' we get

$$x \text{ feet} = \frac{5 \text{ feet-seconds}}{.003708 \text{ seconds}}$$

or

$$x = 1348 \text{ feet}.$$

Shot 17 (Chronograph 2)

The distance from chronograph 1 to chronograph 2 is also five feet. The time required for the projectile to travel from chronograph 1 to chronograph 2 is 371.5 X 10-5 seconds or .003715 seconds. Using a proportion, we calculate the velocity in feet per second as

$$\frac{.003715 \text{ seconds}}{5 \text{ feet}} = \frac{1 \text{ second}}{x \text{ feet}}.$$

Cross multiplying we get

$$.003715x \text{ feet-seconds} = 5 \text{ feet-seconds}.$$

Solving for 'x' we get

$$x \text{ feet} = \frac{5 \text{ feet-seconds}}{.003715 \text{ seconds}}$$

or

$$x = 1346 \text{ feet}.$$

Shot 19 (Chronograph 1)

The time required to travel five feet, the distance from the muzzle to chronograph 1, is 370.8 X 10-5 or .003708 seconds. The distance from the muzzle to chronograph 1 is five feet. Using a proportion, we can compute the velocity in feet per second. If the projectile travels five feet in .003708 seconds, how far will it travel in 1 second?

The proportion is

$$\frac{.003708 \text{ seconds}}{5 \text{ feet}} = \frac{1 \text{ second}}{x \text{ feet}}.$$

Cross multiplication gives

$$.003708x \text{ feet-seconds} = 5 \text{ feet-seconds}.$$

Solving for 'x' we get

$$x \text{ feet} = \frac{5 \text{ feet-seconds}}{.003708 \text{ seconds}}$$

or

$$x = 1348 \text{ feet}.$$

Shot 19 (Chronograph 2)

The distance from chronograph 1 to chronograph 2 is also five feet. The time required for the projectile to travel from chronograph 1 to chronograph 2 is 371.6 X 10-5 seconds or .003716 seconds. Using a proportion, we calculate the velocity in feet per second as

$$\frac{.003716 \text{ seconds}}{5 \text{ feet}} = \frac{1 \text{ second}}{x \text{ feet}}.$$

Cross multiplying we get

$$.003716x \text{ feet-seconds} = 5 \text{ feet-seconds}.$$

Solving for 'x' we get

$$x \text{ feet} = \frac{5 \text{ feet-seconds}}{.003716 \text{ seconds}}$$

or

$$x = 1346 \text{ feet}.$$

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Shot 20 (Chronograph 1)

The time required to travel five feet, the distance from the muzzle to chronograph 1, is 373.5 X 10-5 or .003735 seconds. The distance from the muzzle to chronograph 1 is five feet. Using a proportion, we can compute the velocity in feet per second. If the projectile travels five feet in .003735 seconds, how far will it travel in 1 second?

The proportion is

$$\frac{.003735 \text{ seconds}}{\text{five feet}} = \frac{1 \text{ second}}{x \text{ feet}}.$$

Cross multiplication gives

$$.003735x \text{ feet-seconds} = 5 \text{ feet-seconds}.$$

Solving for 'x' we get

$$x \text{ feet} = \frac{5 \text{ feet-seconds}}{.003735 \text{ seconds}}$$

or

$$x = 1339 \text{ feet}.$$

Shot 20 (Chronograph 2)

The distance from chronograph 1 to chronograph 2 is also five feet. The time required for the projectile to travel from chronograph 1 to chronograph 2 is 374.2 X 10-5 seconds or .003742 seconds. Using a proportion, we calculate the velocity in feet per second as

$$\frac{.003742 \text{ seconds}}{5 \text{ feet}} = \frac{1 \text{ second}}{x \text{ feet}}.$$

Cross multiplying we get

$$.003742x \text{ feet-seconds} = 5 \text{ feet-seconds}.$$

Solving for 'x' we get

$$x \text{ feet} = \frac{5 \text{ feet-seconds}}{.003742 \text{ seconds}}$$

or

$$x = 1336 \text{ feet}.$$

QUESTION 2

The average velocity is the velocity at chronograph 1 plus the velocity at chronograph 2 divided by 2.

The striking velocity is the average velocity minus the loss of velocity (given on the handout) due to wind resistance.

Shot 1

The velocity at chronograph 1 is 1384 feet/second.
The velocity at chronograph 2 is 1380 feet/second.

The average is $\frac{1384 + 1380}{2}$ or 1382 ft/sec.

The striking velocity is the average velocity, 1382 ft/sec, minus the loss due to wind resistance, 40 ft/sec or

1382 ft/sec - 40 ft/sec or 1342.

The average velocity for Shot 1 is 1382 feet/second.
The striking velocity for Shot 1 is 1342 ft/second.

Shot 3

The velocity at chronograph 1 is 1309 feet/second.
The velocity at chronograph 2 is 1306 feet/second.

The average is $\frac{1309 + 1306}{2}$ or 1308 ft/sec.

The striking velocity is the average velocity, 1308 ft/sec, minus the loss due to wind resistance, 37 ft/sec or

1308 ft/sec - 37 ft/sec or 1271.

The average velocity for Shot 3 is 1308 feet/second.
The striking velocity for Shot 3 is 1271 ft/second.

Shot 5

The velocity at chronograph 1 is 1254 feet/second.
The velocity at chronograph 2 is 1251 feet/second.

The average is $\frac{1254 + 1251}{2}$ or 1252 ft/sec.

The striking velocity is the average velocity, 1252 ft/sec, minus the loss due to wind resistance, 35 ft/sec or

1252 ft/sec - 35 ft/sec or 1217.

The average velocity for Shot 5 is 1252 feet/second.
The striking velocity for Shot 5 is 1217 ft/second.

Shot 12

The velocity at chronograph 1 is 1333 feet/second.
The velocity at chronograph 2 is 1329 feet/second.

The average is $\frac{1333 + 1329}{2}$ or 1331 ft/sec.

The striking velocity is the average velocity, 1333 ft/sec, minus the loss due to wind resistance, 38 ft/sec or

1331 ft/sec - 38 ft/sec or 1293.

The average velocity for Shot 12 is 1331 feet/second.
The striking velocity for Shot 12 is 1293 ft/second.

Shot 13

The velocity at chronograph 1 is 1355 feet/second.
The velocity at chronograph 2 is 1351 feet/second.

The average is $\frac{1355 + 1351}{2}$ or 1353 ft/sec.

The striking velocity is the average velocity, 1353 ft/sec, minus the loss due to wind resistance, 39 ft/sec or

1353 ft/sec - 39 ft/sec or 1314.

The average velocity for Shot 13 is 1353 feet/second.
The striking velocity for Shot 13 is 1314 ft/second.

Shot 14

The velocity at chronograph 1 is 1354 feet/second.
The velocity at chronograph 2 is 1351 feet/second.

The average is $\frac{1354 + 1351}{2}$ or 1353 ft/sec.

The striking velocity is the average velocity, 1353 ft/sec, minus the loss due to wind resistance, 39 ft/sec or

1353 ft/sec - 39 ft/sec or 1314.

The average velocity for Shot 14 is 1353 feet/second.
The striking velocity for Shot 14 is 1314 ft/second.

Shot 15

The velocity at chronograph 1 is 1375 feet/second.
The velocity at chronograph 2 is 1371 feet/second.

The average is $\frac{1375 + 1371}{2}$ or 1373 ft/sec.

The striking velocity is the average velocity, 1373 ft/sec, minus the loss due to wind resistance, 39 ft/sec or

1373 ft/sec - 39 ft/sec or 1334.

The average velocity for Shot 15 is 1373 feet/second.
The striking velocity for Shot 15 is 1334 ft/second.

Shot 17

The velocity at chronograph 1 is 1348 feet/second.
The velocity at chronograph 2 is 1346 feet/second.

The average is $\frac{1348 + 1346}{2}$ or 1347 ft/sec.

The striking velocity is the average velocity, 1347 ft/sec, minus the loss due to wind resistance, 38 ft/sec or

1347 ft/sec - 38 ft/sec or 1309.

The average velocity for Shot 17 is 1347 feet/second.
The striking velocity for Shot 17 is 1309 ft/second.

Shot 19

The velocity at chronograph 1 is 1348 feet/second.
The velocity at chronograph 2 is 1346 feet/second.

The average is $\frac{1348 + 1346}{2}$ or 1347 ft/sec.

The striking velocity is the average velocity, 1347 ft/sec, minus the loss due to wind resistance, 38 ft/sec or

1347 ft/sec - 38 ft/sec or 1309.

The average velocity for Shot 19 is 1347 feet/second.
The striking velocity for Shot 19 is 1309 ft/second.

Shot 20

The velocity at chronograph 1 is 1339 feet/second.
The velocity at chronograph 2 is 1336 feet/second.

The average is $\frac{1339 + 1336}{2}$ or 1338 ft/sec.

The striking velocity is the average velocity, 1338 ft/sec, minus the loss due to wind resistance, 38 ft/sec or

1338 ft/sec - 38 ft/sec or 1300.

The average velocity for Shot 20 is 1338 feet/second.
The striking velocity for Shot 20 is 1300 ft/second.

QUESTION 3

The average velocity for the V50 test is the sum of the average striking velocity for each shot divided by the number of shots.

The striking velocity for each shot is as follows:

Shot 1	1342
Shot 3	1271
Shot 5	1217
Shot 12	1293
Shot 13	1314
Shot 14	1314
Shot 15	1334
Shot 17	1309
Shot 19	1309
Shot 20	1300

The total of the average striking velocities is 13003.

Since ten shots were used in the sum, the average velocity for the V50 test is
13003 ÷ 10 or 1300 ft/sec.

QUESTION 4

The high partial for the 10 projectiles used in the sample is either Shot 13 or 14 or 1314 ft/sec.

The low complete for the 10 projectiles used in the sample is Shot 5 or 1217 ft/sec.

QUESTION 5

The range of results for the test is the difference between the highest and lowest average velocity for the projectiles that made a complete hole.

The highest complete average velocity was Shot 1 at 1342 ft/sec. The lowest complete average velocity was Shot 5 at 1217 ft/sec. The range is average velocity of Shot 1 minus the average velocity of Shot 5 or

1342 - 1217 or 125 ft/sec.

The range of mixed results for the test is the difference between the highest partial average velocity and the lowest complete average velocity.

The highest partial average velocity was Shot 13 at 1314 ft/sec. The lowest complete average velocity was Shot 5 at 1217 ft/sec. The range of mixed results is average velocity of Shot 3 minus the average velocity of Shot 5 or

1314 - 1217 or 97 ft/sec.

QUESTION 6

The quality of the material is based on a preset average velocity and the range of results. The preset average velocity for this test was 1200 ft/sec. The range of results was 125 ft/sec. The average striking velocity for the test cannot be more than the sum of the preset velocity and the range of results. The sum of the preset average velocity and the range of results is

1200 ft/sec + 125 ft/sec or 1325 ft/sec.

1325 ft/sec is the maximum amount for the average striking velocity for the overall test results. Since the average striking velocity was only 1300 ft/sec, this lot of Kevlar® is considered of top quality. .

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APPENDIX A

HANDOUT 1

PROBABLE BALLISTIC LIMIT (V50)

Date Rec'd
Via : UPS
Returned : na
File (HPWL1): CS8140-A.V50

Job No. :
Test Date:
Client

SAMPLE

Size : 15 x 15 ins.
No. Plies :
Thickness : na

Avg. Thickness : na
Sample Weight : 0.97 lbs.
Weave Count :

BALLISTIC THREAT

Projectile :
Weight :
Powder : BULLSEYE
Barrel Length : 28 ins.
Obliquity : 0 deg.
Specification : (d) SEE REMARKS

RANGE

A. Muzzle to Scr. 1 : 5.0 ft
B. Scr. 1 to Scr. 2 : 5.0 ft
C. Scr. 2 to Target : 2.5 ft
D. Target to Witness : 6.0 ins
E. Midpoint to Target: 5.0 ft

SAMPLE NUMBER HPW-1

Gunner : UNGER
Recorder : HITCHEM

SAMPLE DESCRIPTION

Shot No.	Powder/ Seating	Chronograph 1 Time (sx10-5)	Chronograph 1 Velocity (ft/s)	Chronograph 2 Time (sx10-5)	Chronograph 2 Velocity (ft/s)	Velocity (ft/s) Average(a)	Velocity (ft/s) Loss(b)	Striking	Results Partial/ Complete	Include in V50 *=Yes
1	5.0	361.4		362.4			40		C	*
2	4.4	412.7		413.6			33		P	
3	4.7	382.0		382.8			37		P	*
4	4.9	345.0		345.8			42		C	
5	4.7	398.8		399.6			35		C	*
6	4.6	453.5		455.0			29		P	
7	4.7	421.2		422.2			32		P	
8	4.8	432.3		433.4			31		P	
9	4.9	424.3		424.9			32		P	
10	5.0	393.2		394.2			35		P	
11	5.1	416.5		417.6			32		P	
12	5.2	375.1		376.1			38		P	*
13	5.3	369.0		370.0			39		P	*
14	5.4	369.3		370.0			38		P	*
15	5.5	363.7		364.7			39		C	*
16	5.4	361.9		362.9			40		Bad Hit	
17	5.4	370.8		371.5			38		C	*
18	5.3	383.5		384.3			37		P	
19	5.4	370.8		371.6			38		P	*
20	5.5	373.5		374.2			38		C	*

REMARKS:
(a) Vel. measured at 7.5 ft from the muzzle.
(b) Vel. loss computed using std. G tables & P = 29.94 in. Hg, T = 75.0 deg. F
(c) PC. NUMBER 1866 012 01
1866 013 03
(d) MIL-C-44050A TYPE 1/CLASS 2

REMARKS CONTINUED:

These tests were performed in accordance with the specification requirements and the results properly reflect the ballistic performance of the listed sample.

SUMMARY:

V50	HIGH PARTIAL	LOW COMPLETE	RANGE OF RESULTS	RANGE OF MIXED RESULTS

HANDOUT 1

TEACHER'S ANSWER KEY

PROBABLE BALLISTIC LIMIT (V50)

Date Rec'd
Via : UPS
Returned : na
File (HPWLI): CS8140-A.V50

Job No. :
Test Date:
Client

SAMPLE

Size : 15 x 15 ins.
No. Piles :
Thickness : na

Avg. Thickness : na
Sample Weight : 0.97 lbs.
Weave Count :

BALLISTIC THREAT

Projectile :
Weight :
Powder : BULLSEYE
Barrel Length : 28 ins.
Obliquity : 0 deg.
Specification : (d) SEE REMARKS

RANGE

A. Muzzle to Scr. 1 : 5.0 ft
B. Scr. 1 to Scr. 2 : 5.0 ft
C. Scr. 2 to Target : 2.5 ft
D. Target to Witness : 6.0 ins
E. Midpoint to Target: 5.0 ft

SAMPLE NUMBER HPW-1

Gunner : UNGER
Recorder : MITCHEM

SAMPLE DESCRIPTION

Shot No.	Powder/ Seating	Chronograph 1 Time (sx10-5)	Chronograph 1 Velocity (ft/s)	Chronograph 2 Time (sx10-5)	Chronograph 2 Velocity (ft/s)	Velocity (ft/s) Average(a)	Velocity (ft/s) Loss(b)	Striking	Results Partial/ Complete	Include in V50 "*"=Yes
1	5.0	361.4	1384	362.4	1380	1382	40	1342	C	*
2	4.4	412.7		413.6			33		P	
3	4.7	382.0	1309	382.8	1306	1308	37	1272	P	*
4	4.9	345.0		345.8			42		C	
5	4.7	398.8	1254	399.6	1251	1252	35	1217	C	*
6	4.6	453.5		455.0			29		P	
7	4.7	421.2		422.2			32		P	
8	4.8	432.3		433.4			31		P	
9	4.9	424.3		424.9			32		P	
10	5.0	393.2		394.2			35		P	
11	5.1	416.5		417.6			32		P	
12	5.2	375.1	1333	376.1	1329	1331	38	1293	P	*
13	5.3	369.0	1355	370.0	1351	1353	39	1314	P	*
14	5.4	369.3	1354	370.0	1351	1353	38	1314	P	*
15	5.5	363.7	1375	364.7	1371	1373	39	1334	C	*
16	5.4	361.9		362.9			40		Bad Hit	
17	5.4	370.8	1348	371.5	1346	1347	38	1309	C	*
18	5.3	383.5		384.3			37		P	
19	5.4	370.8	1348	371.6	1346	1347	38	1309	P	*
20	5.5	373.5	1339	374.2	1336	1338	38	1300	C	*

REMARKS:
(a) Vel. measured at 7.5 ft from the muzzle.
(b) Vel. loss computed using std. G tables &
P = 29.94 in. Hg, T = 75.0 deg. F
(c) PC. NUMBER 1866 012 01
1866 013 03
(d) MIL-C-44050A TYPE 1/CLASS 2

REMARKS CONTINUED:

These tests were performed in accordance with the specification requirements and the results properly reflect the ballistic performance of the listed sample.

SUMMARY:

V50	HIGH PARTIAL	LOW COMPLETE	RANGE OF RESULTS	RANGE OF MIXED RESULTS
1300	1314	1217	125	97

MATHEMATICS FOR THE WORKPLACE

APPLICATIONS FROM INSURANCE

A TEACHER'S GUIDE

Developed by:

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(December 1990)

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Appendix

INTRODUCTION

The workplace of tomorrow will require skills beyond the twelfth grade level. Technological advances require higher levels of mathematics skills for employees to function efficiently in the workplace. Many employees need workers who can solve problems of varying complexity involving arithmetic, algebraic, and geometric operations.

Because of the higher levels of mathematical skills now needed to succeed in the workplace, now more than ever there should be greater relevance between what is taught in the classroom and what occurs daily in the real world . Teaching skills in an isolated setting does little to motivate many students to take their studies seriously.

When information is presented in an isolated setting, students who are unable to see a connection between what is taught in the classroom and what happens in the real world may become disinterested in the subject. This disinterest usually results in a lack of motivation. Consequently, students perceive no need to apply themselves to their studies and may not take courses which challenge them as learners.

Examples from real-life settings often help students better understand the need to study and learn mathematics taught in the classroom. Real-life applications can provide the needed relevance to motivate students, not only to apply themselves to their studies, but also to take the highest level of math they are capable of handling successfully. Mathematics for the Workplace: Applications from Insurance Sales is designed to present a real-world context where mathematics skills are used as part of a daily routine.

One intent of Mathematics for the Workplace: Applications from Insurance is to help students understand the significance of following through various processes in trying to obtain a solution. An additional purpose is to help students see the need for being accurate and detailed when making calculations.

HOW TO USE THIS MODULE

The table of contents lists the sections contained in the module. This section, How to Use this Module, gives teachers an explanation of the procedures used in completing the exercise. Not all of the information presented in this module is to be duplicated and given to the students. **There are, however, several sections which should be duplicated and given to the students so they can complete the assignment.**

Pages 3-5 give students an introduction to the career field of insurance sales. Included in this section is information on special requirements for obtaining licensure, job-related duties, how to receive special training and earnings and advancements. **These pages should be duplicated and given to the students as introductory information.**

Pages 5-6 give information regarding the types of vehicular insurance available in South Carolina. It provides other information such as factors which influence insurance rates, safe driver discount and recoupment.

Pages 7-9 present a job-related task. In this section, students receive an explanation of the task and information to help them complete the task. **This section may be duplicated and given to the students as information.**

Page 10 gives related problems for students to work. **This section may be duplicated and given to the students as information.**

Pages 11-15 are the answer keys to the related problems. The answer keys give a detailed description of each answer for the related problems.

The Appendix contains the handouts required to complete the lesson.

EXPLORING A CAREER: Insurance agent

An individual may gain employment in the insurance industry as a sales agent, insurance broker, or general agent. Sales agents may sell several types of insurance or specialize in a particular type of insurance, such as casualty, fire, life, or automobile. Insurance brokers work independently, selling insurance for a variety of companies. General agents also work independently but sell insurance for only one company.

Agents should like having business contact with people, communicating information, and working with little supervision. They should be able to understand information in written, spoken, and graphic form; direct, control, and plan activities; and collect data, establish facts, and make decisions.

SPECIAL REQUIREMENTS

Insurance agents are required to be licensed by the state in which they sell insurance. In order to be licensed, prospective agents must pass a written examination covering the fundamentals of insurance and the particular state's insurance laws.

Before individuals can take the licensing examination, they must complete 40 hours of classroom instruction in insurance sales. The 40-hour program covers such topics as rules governing insurance, South Carolina laws, basic insurance coverage information, and definitions of related terms. This program of preparatory studies is approved by the South Carolina Insurance Agents Association. The licensing examination consists of 100 multiple choice items.

Many insurance companies prefer to hire college graduates as insurance agents but may hire **high school graduates** with proven or potential sales ability.

A driver's license is also a requirement because agents spend considerable amounts of time traveling to confer with their clients.

JOB-RELATED DUTIES

Insurance agents' duties include
- compiling lists of prospective clients,
- advising clients regarding financial needs,
- assisting clients with benefit claims,
- computing and collecting premiums, and
- keeping detailed records of policies.

WORKING CONDITIONS

Insurance agents usually work under minimum supervision. They arrange their own schedules, which often include weekend and evening appointments. Agents may spend large amounts of time in their cars because of the associated travel. When working indoors, agents generally work in modern office settings.

HIGH SCHOOL PREPARATION

In order to best prepare for a program of studies in insurance sales while in high school, students should take algebra, business, business-related, and computer courses.

Students can obtain additional information on insurance careers from school guidance offices, libraries, or local insurance agencies.

HOW TO RECEIVE TRAINING

Some universities and colleges offer courses in insurance while others offer a bachelor's degree in insurance. (However, no colleges or universities in South Carolina offer a degree in insurance.)

An alternative to earning a degree in insurance would be to earn a degree in business. A business degree (two-year or four-year) gives individuals the background in finance, mathematics, accounting, and other business-related courses, including computers, which enables agents to relate insurance needs to personal finances and economic factors.

Many state and local insurance companies also offer home-study or evening courses which can help in preparing for the state licensure examination.

EARNINGS AND ADVANCEMENTS

In South Carolina, insurance agents earned an average annual salary of $21,600 in 1988. Nationally, annual salaries in 1988 averaged $28,444. Many agents with more than ten years of experience earned over $70,000 in 1988.

Beginning sales agents were paid a starting (base) salary of $1,400 per month for a six-month training period in 1987. A base salary may be maintained for a period of time while the agent builds up a clientele. After this period has expired, agents are usually paid on commission. The size of the commission will depend on the type and amount of insurance sold.

INTRODUCING THE LESSON

The teacher could begin the lesson by asking who would be responsible if a vehicular accident occurred. Who would pay for the damages to the vehicle? Who would pay associated medical expenses for an injured party not at fault? Most students would immediately respond with "insurance." At this point, the teacher could begin to focus the discussion by asking questions like: "What is insurance? What types of vehicular insurance are available? Are there types mandated by law? How much does insurance cost? How is insurance affected by the age and driving record of the driver?"

WHAT IS INSURANCE?

Insurance is a means by which individuals protect themselves from damage to or loss of personal property due to collision, vandalism, theft, or fire. Insurance also provides medical payments for injuries to passengers in the car when the accident occurred.

TYPES OF VEHICULAR INSURANCE

Act 1177 of 1974 requires all drivers in South Carolina to have a minimum of liability and uninsured motorist protection insurance. Liability insurance provides financial protection for the at-fault driver. The at-fault party's liability insurance pays for repairs of damages to the other party's property. Uninsured motorist protection provides for repair of damages to an individual's property if the other party (who is at fault) has no liability protection.

Three types of insurance coverage not mandated by law are collision, comprehensive, and personal injury protection. Collision coverage pays for repair of damages to the at-fault party's property. Comprehensive coverage pays for repairs of damages due to theft, fire, or vandalism. Damages resulting from hitting an animal are also covered by comprehensive insurance. Personal injury protection provides for medical payments and loss of wages payment to the driver and anyone else in the vehicle regardless of who is at fault.

Although collision, comprehensive, and personal injury protection are not required by law, individuals need to protect themselves and their investments. These insurance coverages protect individuals from financial loss in the event of an accident. Also, many financial corporations require full coverage to protect property which they have financed.

FACTORS AFFECTING INSURANCE RATES

Insurance rates are based on several factors. Included are

- age of driver;
- location of residency;
- purpose for which the vehicle is to be used;
- distance driven each day;
- applicant's driving record.

Another important factor which affects the amount of the insurance premium is the **safe driver discount. Safe driver discount** is the amount of reduction in premium because the driver has no insurance department points against his driving record. (The points assessed for insurance purposes are not the same as the points assessed by the South Carolina Highway Department. For an example of how points are calculated for insurance purposes, see the sheet explaining RECOUPMENT (located in the Appendix). **This sheet could be copied and given to students.** It will be used in later problems.)

A high school student who has not taken driver's education automatically loses his safe driver discount. This means a high school student who has not taken driver's education but has a driver's license is classified as having been involved in at least one at-fault accident or traffic violation in the past three years. This rating also means that the insurance premium will be more for this student than for a student who had completed driver's education.

PERFORMING THE TASK

A sample problem allowing students to compute the insurance premium on a motorcycle is given. The rates sheet and insurance application are included in the appendix. **These materials should be copied and given to the students.**

The related problems, which follow the sample problem, give students the opportunity to expand on the knowledge gained from the sample problem. Students will be asked to analyze various situations to determine the effect on insurance premiums. These problems cover both motorcycle and automobile insurance.

SAMPLE PROBLEM

Your parents have agreed to purchase a new motorcycle as your birthday present. Although they would like to purchase a used motorcycle, you persuade them to purchase a new one instead. The type you finally agree on is a 1990 Yamaha 350. The price of the motorcycle is $2950. Since you have a part-time job, you must pay half of the annual insurance premium. Your parents are requiring full coverage for the motorcycle including liability, collision, comprehensive, personal injury protection, and underinsured motorist coverage.

Given the rate sheet for motorcycle insurance (HANDOUT 1) and the insurance application (HANDOUT 2), have students compute the annual insurance premium for the motorcycle.

COMPLETING THE APPLICATION

SECTION I: THE APPLICANT

Have students complete the section on the applicant. The students can use either themselves as the applicant or use one of their parents.

SECTION II: ACCIDENTS OR TRAFFIC CONVICTIONS

This section lists accident or traffic violations of the applicant or any other driver of the motorcycle within the past 36 months (3 years). Students should leave this blank based upon the assumption that anyone who will be operating the vehicle has not had any at-fault accidents or traffic violations within the past 36 months.

SECTION III: DESCRIPTION OF THE MOTORCYCLE

The description of the motorcycle is given in the word problem. Assume zero points since there have been no accidents or traffic violations in the past three years. Also, leave the serial number segment blank.

SECTION IV: LOSS PAYEE

Loss payee is usually the applicant.

SECTION V: ADDITIONAL EQUIPMENT

No additional equipment was added to the motorcycle.

SECTION VI: UNDERINSURED MOTORIST COVERAGE

Underinsured motorist coverage is a requirement.

SECTION VII: COMPUTING THE ACTUAL PREMIUM

Using the annual rates chart provided, have students compute the total premium. The class operator for the premium is 02 because one of the operators of the vehicle is under 30 years of age. Also, the safe driver discount rates will be used.

The amount of the premium is based on the number of cubic centimeters (cc's) which is 350. Looking at the liability chart, we find the liability premium for a 350-cc motorcycle to be $115.

Collision, comprehensive, and personal injury protection are based on a percentage of the cost of the motorcycle. The age group of the motorcycle is 1 because the motorcycle is new. Using the 02 classification, with safe driver rates, the base factor for collision, comprehensive, and personal injury protection is .140.

To compute the collision, comprehensive, and personal injury protection premium, multiply .185 by 2950 (the cost of the motorcycle). The amount of the collision, comprehensive, and personal injury protection premium is $546.

The amount for underinsured motorist protection is $48.

The total premium amount is liability plus comprehension, collision, and personal injury plus underinsured motorist or

$115 + $546 + $48 = $709.

The total, $709, is the annual premium for the motorcycle.

APPENDIX

EFFECTIVE 5-1-90

Handout 1

Jack West & Associates, Inc.
Managing General Agents

WINDSOR INSURANCE COMPANY (A+)

SOUTH CAROLINA - MOTORCYCLE INSURANCE RATES

Anderson

TERRITORY 2 - REMAINDER OF STATE
(All territories except 60, 83 and 91)

CLASS 01 - ALL OPERATORS AGE 30 AND OVER
CLASS 02 - ANY OPERATOR UNDER 30

ANNUAL RATES

LIABILITY
$15,000/$30,000/$5,000
(Includes Uninsured Motorist Coverage)

	SAFE DRIVER RATES 0 POINTS		*BASE RATES 1 POINT (For Additional Points, Apply Surcharge)*	
CC'S	CL 01	CL 02	CL 01	CL 02
0 - 100	45	59	59	75
101 - 200	52	66	67	84
201 - 360	61	96	78	119
361 - 500	70	97	93	130
501 - 800	82	134	106	180
801 & Over	113	161	146	214

UNDERINSURED MOTORIST COVERAGE

LIMITS	*ANNUAL PREMIUM*
$15,000/$30,000/$5,000	$100

The named insured must complete a separate Form S-75 (11/[illegible]) OFFER OF UNDERINSURED MOTORCYCLE INSURANCE COVERAGE. If not rejected, this coverage will be included.

COLLISION, FIRE, THEFT and CAC - Deductibles as shown
(Multiply N.A.D.A. Suggested List Price by rate below - Round to closest $1.00)

CLASS 01		SAFE DRIVER RATES 0 POINTS CYCLE AGE GROUP*				BASE RATES - 1 POINT (For Additional Points, Apply Surcharge) CYCLE AGE GROUP*			
CC SIZE	Deductible Coll., Fire, Theft, C.A.C.	1	2, 3	4, 5	6	1	2, 3	4, 5	6
0 - 100	$100	.092	.079	.069	.051	.111	.095	.083	.062
101 - 200	$150	.090	.078	.069	.050	.111	.094	.083	.060
201 - 360	$150	.104	.088	.078	.057	.125	.106	.094	.069
361 - 500	$250	.097	.082	.073	.053	.117	.099	.088	.064
501 - 800	$250	.105	.090	.073	.054	.126	.108	.090	.065
801 - Over	$250	.133	.103	.088	.065	.160	.126	.107	.078

UNIFORM MERIT RATING PLAN APPLIES - SURCHARGE LIABILITY & PHYSICAL DAMAGE $20 FOR EACH POINT OVER ONE.

CLASS 02		SAFE DRIVER RATES 0 POINTS CYCLE AGE GROUP*				BASE RATES - 1 POINT (For Additional Points, Apply Surcharge) CYCLE AGE GROUP			
CC SIZE	Deductible Coll., Fire, Theft, C.A.C.	1	2, 3	4, 5	6	1	2, 3	4, 5	6
0 - 100	$100	.139	.118	.104	.076	.167	.142	.125	.092
101 - 200	$150	.138	.118	.104	.077	.166	.142	.125	.093
201 - 360	$150	.157	.134	.118	.086	.189	.161	.142	.104
61 - 500	$250	.147	.125	.111	.081	.177	.151	.134	.098
01 - 800	$250	.179	.152	.129	.094	.215	.183	.161	.118
801 - Over	$250	.228	.181	.158	.114	.274	.232	.193	.141

**Age Group I includes all cycles of the current model year.*
The model year is deemed to change on January 1 of each year regardless of introduction date of various models.

EFFECTIVE 5-1-90

WINDSOR INSURANCE COMPANY (A+)

Jack West & Associates, Inc.
Managing General Agents

SOUTH CAROLINA – MOTORCYCLE INSURANCE RATES

TERRITORY 1 – ISO Territories
60 – Charleston County,
83 – Lexington County, and 91 – Richland County

CLASS 01 – ALL OPERATORS AGE 30 AND OVER
CLASS 02 – ANY OPERATOR UNDER 30

ANNUAL RATES

LIABILITY
$15,000/$30,000/$5,000
(Includes Uninsured Motorist Coverage)

	SAFE DRIVER RATES 0 POINTS		*BASE RATES 1 POINT (For Additional Points, Apply Surcharge)*	
CC'S	CL 01	CL 02	CL 01	CL 02
0 – 100	52	66	67	87
101 – 200	60	82	76	104
201 – 360	72	115	92	147
361 – 500	80	127	101	159
501 – 800	97	173	121	212
801 & Over	139	202	175	249

UNDERINSURED MOTORIST COVERAGE

LIMITS	*ANNUAL PREMIUM*
$15,000/$30,000/$5,000	$100

The named insured must complete a separate Form S-75 (11/89) OFFER OF UNDERINSURED MOTORCYCLE INSURANCE COVERAGE. If not rejected, this coverage will be included.

COLLISION, FIRE, THEFT and CAC – Deductibles as shown
(Multiply N.A.D.A. Suggested List Price by rate below – Round to closest $1.00)

CLASS 01		SAFE DRIVER RATES 0 POINTS CYCLE AGE GROUP*				BASE RATES – 1 POINT (For Additional Points, Apply Surcharge) CYCLE AGE GROUP*			
CC SIZE	Deductible Coll., Fire, Theft, C.A.C.	1	2, 3	4, 5	6	1	2, 3	4, 5	6
0 – 100	$100	.104	.088	.078	.057	.126	.107	.087	.070
101 – 200	$150	.109	.087	.077	.057	.123	.105	.093	.069
201 – 360	$150	.121	.103	.091	.067	.146	.124	.110	.081
361 – 500	$250	.111	.094	.083	.061	.135	.114	.100	.074
501 – 800	$250	.125	.106	.932	.069	.150	.128	.112	.083
801 – Over	$250	.156	.132	.117	.086	.188	.159	.141	.104

UNIFORM MERIT RATING PLAN APPLIES – SURCHARGE LIABILITY & PHYSICAL DAMAGE $20 FOR EACH POINT OVER ONE.

CLASS 02		SAFE DRIVER RATES 0 POINTS CYCLE AGE GROUP*				BASE RATES – 1 POINT (For Additional Points, Apply Surcharge) CYCLE AGE GROUP			
CC SIZE	Deductible Coll., Fire, Theft, C.A.C.	1	2, 3	4, 5	6	1	2, 3	4, 5	6
0 – 100	$100	.162	.138	.121	.089	.195	.166	.146	.107
101 – 200	$150	.170	.144	.127	.093	.205	.174	.153	.112
201 – 360	$150	.185	.157	.139	.102	.222	.189	.167	.123
361 – 500	$250	.173	.147	.130	.095	.209	.176	.156	.116
501 – 800	$250	.193	.164	.145	.106	.232	.197	.174	[illegible]
801 – Over	$250	.250	.212	.187	.137	.300	.255	.225	.165

**Age Group I includes all cycles of the current model year.*
The model year is deemed to change on January 1 of each year regardless of introduction date of various models.

MAIL TO:
Jack West & Associates, Inc.
Managing General Agents
P.O. BOX 47000 • JACKSCNVILLE, FLORIDA 32247-7000

ALPHA PROPERTY & CASUALTY INSURANCE COMPANY
SOUTH CAROLINA
MOTORCYCLE INSURANCE APPLICATION

Handout 2

PPLICANT

AME ____ (MUST BE 18 YEARS OLD) ____ (LAST NAME) ____ (FIRST NAME) ____ (MIDDLE INITIAL)

ADDRESS ____ (STREET NUMBER) ____ (CITY) ____ (S.C. ZIP CODE) (____) (COUNTY)

OCCUPATION ____ EMPLOYER ____

RESIDENCE PHONE ____ BUSINESS PHONE ____

List all operators and any accidents or traffic convictions during past 36 months. (Use back of application for additional space.)

Name	Age	Date of Birth	Drivers License Number	State	Date 1st Lic.*	Date of Viol	Type of Accident/Conviction
APPLICANT ➡							

*If licensed less than 1 year, apply Base Rates.

DESCRIPTION OF MOTORCYCLE

Year	Make	Model Name & Number	Frame Serial Number (VIN) (Do Not Bind Without Complete Number)	Displacement in CC's	NADA Sugg List (incl. Add On Equip.)	Date Purchased	New/Used	Points

Loss Payee ____

ddress ____

City, State, Zip ____

ADD ON EQUIPMENT

The items listed below will be covered **only** if the Cost New for each item is listed and their total is included in the "N.A.D.A. Sugg. List" box above.

ITEM	COST NEW
Fairing	
Windshield	
Luggage Rack	
Trailer	
TOTAL	$

Company Terr.		Fire No.	ISO Terr.
1	2		

EFFECTIVE DATE
- Annual Only -

Liability Premium 15/30/5 $____

Liability Surcharge $____

Collision, Fire, Theft, CAC $____

Collision Surcharge $____

☐ Special Hazard Surcharge (Surcharge Base Rates Only) $____

Sub Total $____

☐ SR 22 Filing Fee $____

Discount - See Underwriting Rules $____

★ Underinsured Motorist Include premium unless rejected $____

TOTAL PREMIUM $____

MAKE CHECK PAYABLE TO: **Jack West & Associates, Inc.**

★ UNDERINSURED MOTORIST COVERAGE - REJECTION

I/we have been offered Underinsured Motorist Coverage with limits of $15,000 each person/$30,000 each accident. I/we understand Underinsured Motorist Coverage and hereby reject this coverage in this policy and all future renewal policies.

Applicant's Signature ✗ ____

AGENT CODE: 1725
ANDERSON INSURANCE CENTER
PO BOX 836
ANDERSON, SC
29622

APPLICANT'S STATEMENT

I/we hereby certify the answers and information contained herein to be true and complete. I/we understand if records reveal any undisclosed accidents or convictions which result in additional premium due, I/we will be billed accordingly. **I/we also understand that all resident erators of this motorcycle must be listed on this application.**

ALL OPERATORS MUST BE LICENSED

Signature ✗ ____ 140

Date/Time of Application: ___/___/___ (Date) ____ (Time) ☐ AM ☐ PM

Signature of Agent ✗ ____

HOME OFFICE USE ONLY

CO NO	STAT NUMBER	POLICY NUMBER	MOPED	ISO TERR	AGENT NUMBER	RISK TERR	REN/D	CO
	39		YES NO					

9295-6277 1 89

SURCHARGE TABLE

SPEEDING CONVICTIONS

Offense	Points
• First conviction, less than 10 mph over limit	0
• Second Conviction, less than 10 mph over limit	1
• Third and all after, less than 10 mph over limit	2
• First conviction, over 10 mph over limit	1
• Second conviction, over 10 mph over limit	2
• Third and all after, over 10 mph over limit	3
• Each speeding with any bodily injury over $300 or property damage over $750**	4
• Each racing on public highways	10
• Reckless driving, but no accident resulting	4

**$200 for accidents prior to July 26, 1986
**$400 for accidents prior to July 1, 1988

CHARGEABLE ACCIDENTS

Offense	Points
• Each accident with no bodily injury but property damage under $750 **	0
• Each accident with bodily injury over $300 or property damage over $750**	1
• Each accident involving bodily injury over $300 or death	2
• First accident with no bodily injury, but property damage over $750**	1
• Each additional accident with no bodily injury, but property damage over $750**	2
• First and each additional accident while driving under the influence which results in any bodily injury or property damage over $750**	20
• First and each additional accident involving reckless driving which results in any bodily injury or property damage over $750**	15
• Hit and run convictions which result in property damage only	10
• Hit and run convictions which result in bodily injury	20

MOVING VIOLATIONS
(Other than accidents and speeding)

Offense	Points
• First moving violation, if not listed here*	1
• Each additional moving violation, if not listed here	2

* If moving violation conviction for offense not listed here occurs in connection with accident, assign points for accident only

Offense	Points
• Driving under the influence, no accident resulting	15
• Homicide or assault with auto	15
• Failure to stop when signaled by law enforcement	10
• Failure to stop for school bus	10
• Transporting illegal whiskey	15

OTHER VIOLATIONS

Offense	Points
• Principal operator not licensed for one year	1
• Knowingly permitting an unlicensed person to drive	4
• Knowingly permitting operation of an uninsured vehicle	8
• Lending operators license	8
• Operating without valid license	8
• Operating while under suspension	8
• Making false statements in application for license registration	8
• Impersonating an applicant for license or registration	8
• Procuring any license or registration through impersonation	8
• Operating a motor vehicle without a reasonable belief that use is authorized by owner	8

SOUTH CAROLINA INSURANCE NEWS SERVICE

Suite 508
1136 Washington Street
Columbia, SC 29201
Office: 803/252-3455

RECOUPMENT

WHAT IS YOUR SHARE OF $147 MILLION ?

RECOUPMENT

YOUR SHARE OF $147 MILLION

In 1989, the South Carolina Reinsurance Facility had an operating loss of $147 million on private passenger cars it insures. This agency, created by state government in 1974 to insure high risk drivers, has accumulated a total operating loss of about one billion dollars since it began.

These losses have been paid by the recoupment fee which is paid by all insured drivers.

Up until 1988 all car owners paid an equal amount into the system designed to make insurance available and affordable to all drivers regardless of their potential for loss. Using this mechanism, insurance companies can identify high risk drivers and place them in the Reinsurance Facility where their rates will be subsidized by all other drivers. This subsidy in 1988-89 was about $147 million.

The recoupment fee is not insurance premium. It is a "tax" required by law to help pay the premiums of high risk drivers insured through the Reinsurance Facility. It is the price drivers pay in South Carolina for the "benefits" of compulsory insurance.

The fact that the Reinsurance Facility's cumulative losses have been about one billion dollars since 1974 shows that insurance underwriters are very good at picking out drivers who are not paying rates equal to their potential for loss. If the Reinsurance Facility were not losing money, it would indicate that the facility was being used to insure many low risk drivers.

As it was originally created in 1974, the annual losses of the facility were divided equally among all drivers of the state. Since these losses were the result of accidents caused by hazardous drivers, cautious drivers paid an equal amount into the fund and were penalized for safe driving. They subsidized the poor driving habits of the drivers who caused all the losses.

In 1989 the law was changed to make hazardous drivers pay more. But good drivers still subsidize the poor driving habits of bad drivers.

Until 1988 the recoupment fee was built into the rates drivers paid. It was a hidden tax which most drivers did not know they were paying.

In 1987 the Governor signed a bill passed by the General Assembly putting the recoupment fee on premium notices so that all drivers learned what their share of the previous year's Reinsurance Facility losses were.

In 1989 the General Assembly cut the subsidy in half for good risk drivers. But this "bill" still has to be paid in full.

A driver's traffic record determines the amount of recoupment he pays. Drivers with a record of accidents and traffic law violations in three years will pay more than drivers with clean records.

A driver with one point and full coverage auto insurance will now pay almost four times as much recoupment fee ($171.44) as a driver with no points. Drivers with two points will see their recoupment fee go to $342.88 and 10 or more insurance points will increase the recoupment to $1,714.40 this year. (DUI is 15 points).

Drivers with no at-fault accidents or violations in three years still have to pay the fee. A responsible driver with full coverage had to pay $39.75 after July 1, 1990 as his share of the $147 million in losses.

Drivers with a record of violations and at-fault accidents during a three year period pay more according to a formula included in the 1989 Auto Insurance Reform Act.

The S.C. Department of Insurance has drawn up a point system which all insurance companies are required to use. This point system is not the same as that used by the S.C. Highway Department. The number of points a driver gets depends on the severity of the offense. (See chart on back).

It is possible for a driver to accumulate more than 10 insurance points on his record. Drunk driving, for example, is a 15-point offense and will result in higher merit plan surcharges. But the recoupment fee increases only up to 10 points. The recoupment fee is $1,714.40 for ten or more points.

The recoupment fee does not take the place of merit plan surcharges. These also increase the cost of insurance for drivers with records.

Drivers lose their 20 percent safe driver discount for a one point violation. That may cost $100 in additional premiums. Then, for every additional point the merit plan adds $40 a year in surcharges if they have full coverage auto insurance.

Surcharges for hit and run conviction (20 points) would be $800. Add to that a loss of safe driver discount ($100) and increased recoupment ($1,714.40) and, if there is bodily injury, this offense will cost $2,614.40 annually.

That's a fair motive to drive with courtesy, caution and common sense. This year each driver is paying a share of $147 million. Next year it may be $200 million.

The amount of the recoupment fee will change every year because it is based on the Reinsurance Facility losses of the previous year, but the idea will remain the same.

Drivers without points will pay the base rate, drivers with points will be charged according to the number of points they have accumulated over a three-year period.

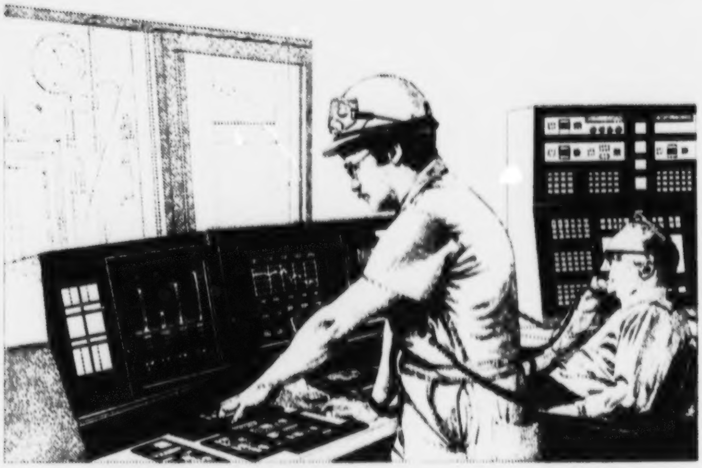
All these figures are for full coverage, including the state-mandated liability and uninsured motorist coverage and the optional coverages of collision and comprehensive. A driver may reduce his recoupment tax by cancelling the optional coverages.

However, car-owners should remember that, though the law does not require collision and comprehensive, finance companies do. They want to protect their investments. Policyholders need to protect their own investments. Dropping optional coverages may be financially dangerous.

Who Pays How Much?

Insurance merit rating points	% of total insured vehicles	Recoupment fee under 1990 law
0	83.68	39.75
1	9.39	171.44
2	2.34	342.88
3	1.29	514.32
4	.98	685.76
5	.41	857.20
6	.24	1,028.64
7	.13	1,200.08
8	.27	1,371.52
9	.13	1,542.96
10 or more	1.12	1,714.40

MATHEMATICS
FOR THE WORKPLACE



APPLICATIONS FROM
TEXTILE MANUFACTURING

(Milliken Industries, Peerless Plant)

A TEACHER'S GUIDE

Developed by:

Johnny M. Wallace and **Mr. Mike Powell**

Associate Director / Curriculum Developer
Partnership for Academic and Career
Education

Personnel Manager
Milliken Industries, Peerless Plant

(December 1990)

Partnership for Academic and Career Education (PACE)
P. O. Box 587
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INTRODUCTION

The workplace of tomorrow will require a level of skills beyond the twelfth grade. Technological advances have necessitated higher levels of mathematics skills for employees to function efficiently in the workplace because employers need workers who can interpret information presented in different formats.

Because of the increased emphasis on high level mathematics skills, teachers must ensure a strong relationship between what they teach in the classroom and what transpires in the real world. Unless students see the importance between what is taught and what is important in real life, they may not be motivated to take their mathematics studies seriously and may not take courses which challenge them as learners.

Examples from real-life settings often help students better understand the need to study and learn mathematics skills taught in the classroom. Real-life applications can provide the needed relevance to motivate students not only to apply themselves to their studies but also to take the highest level of mathematics they are capable of handling successfully. **Mathematics for the Workplace: Applications from Textile Production** is designed to present a real-world context where mathematics skills are used as part of a daily routine. The context for this module is the textile production area of machine operations.

One intent of **Mathematics for the Workplace: Applications from Textile Production** is to help students understand the significance of mathematics skills in interpreting charts and graphs. An additional purpose is to help students see how charted information can be used to compare the same process over a period of time.

USE OF THIS MODULE

The table of contents lists the sections contained in the module. This section, Use of the Module, gives teachers an explanation of the procedures used in completing the exercise. Not all of the information presented in this module is to be duplicated and given to the students. **There are, however, several sections which should be duplicated and given to the students so they can complete the assignment.**

Pages 3-5 give students an introduction to the career field of textile operators. Included in this section is information on duties of operators, working conditions, and high school preparation. **These pages should be duplicated and given to the students as introductory information.**

Pages 6-7 present a job-related task. In this section, students receive an explanation of the task and information to help them understand the need for the task. This section also provides teachers with an understanding of the requirements to complete the task. This section may be duplicated and given to the students as information.

Pages 8-11 are the answer keys to the questions asked in the lesson. The answer keys give the solutions to each part of the problems.

The appendix contains the handout required to complete the lesson.

INTRODUCTION

Textile machine operators, or "associates," as many employers now refer to employees, have the responsibility of transforming fibers, either natural or manmade, into textile products. Textile products include clothing, carpeting, and fabrics used on furniture.

Various stages of fabric development require different types of operators. Machine operators usually specialize in one part of the production process. Operator titles include

- *bleachers*--dying or bleaching yarn wound on beams, tubes, or coils;

- *operators and tenders*--operating machines that spin fibers into the yarn to be used in textiles;

- *setters and setup operators*--preparing and repairing machinery which operators and tenders run;

- *bonding setters*--setting up and running machines that bond, stretch, and apply finishes to thread.

With the integration of computers into the manufacturing process, operators must now be familiar with all of the various stages of the manufacturing process. In addition, many textile companies are setting up teams which work together to ensure the greatest productivity and efficiency from the machines. This team approach to manufacturing requires operators to rotate through the various operational set-ups.

DUTIES OF TEXTILE MACHINE OPERATORS

Textile machine operators perform a range of duties. Depending on the type of machines they oversee, operators' duties may include

--maintaining machines;
--troubleshooting to locate problems with machines;
--repairing breaks in fibers;
--monitoring the supply of fibers;
--controlling colors and patterns for fibers.

WORKING CONDITIONS

Textile machine operators work in buildings where temperature and ventilation may vary. Most buildings have been air conditioned because of the integration of computers into the manufacturing process. Most modern textile plants are free of dust and other materials because of advancements in technology and the corresponding impact on textile manufacturing.

Machine operators usually work eight hours per day or forty hours per week; however, production demands may require them to work overtime. Much of the work done by textile machinery operators can be very repetitious.

HIGH SCHOOL PREPARATION

Many of the machines used in textile production today are run by computers. Computer controlled machines require operators to have higher level math and science skills. In order to best prepare for textile machine operations, students should take algebra, science, mechanics, and computer courses.

Students can obtain additional information on textile careers from school guidance offices, libraries, area colleges, or local textile industries.

POSTSECONDARY EDUCATION

Because of increased integration of technology into textile production, additional, specific postsecondary training in textile manufacturing processes can enhance advancement opportunities.

Area colleges which offer textile programs are

Tri-County Technical College
Contact: James C. Burns
Department Head
Textile Management
Technology
Tri-County Technical
College
P. O. Box 587
Pendleton, SC 29670

Clemson University
Contact: C.D. Rogers
Director
Textile Management
and Textile Science
Clemson University
Clemson, SC 29634

EARNINGS AND ADVANCEMENTS

Earnings for textile workers are dependent on the years of experience in textile production, skill level and amount of postsecondary education. In upsate South Carolina (1990) salaries ranged from $12,000 (entry-level) to $24,000 (highest skill level). Earnings will also vary depending on the type of machine operated, the size of the company, and the shift worked by the operator.

Machine operators can advance in several ways; for example, they might become instructors and train new employees; assume positions that require higher skills and more supervisory responsibilities or take courses will provide additional skills.

INTRODUCTION TO THE TASK

One concern of textile production is the number of defects which are found in fabric while it is being inspected. An inordinate number of defects in the fabric may cause the entire roll to have to be scrapped or sold for second quality material. First quality fabric may have small numbers of defects in the material.

There are different types of defects found in fabric. Defects include

- light or heavy marks--streaks in the materials, usually caused by a missing thread;
- slack or broken picks--resulting in a pucker or fold in the fabric;
- yarn defects--yarn being used in the production process which has an inconsistent diameter or is wavy, puffy, or thin;
- jerk in waste--some type of stray materials that have been pulled into the fabric during the weaving process and woven into the material, usually resulting in a bulge;
- other--may include oil from the machine, handprints, smudges or tears in the fabric.

One method used by textile plants to compare the number of defects in fabric is the construction of graphs. Each graph shows the number of defects per production period over a certain length of time. Each bar of the graph is broken into the various types of defects tracked by the company.

Handout 1 gives a graphic display of production periods for one year. The graph gives employees the opportunity to see if the number of defects is being reduced, is increasing, or is remaining constant. Comparisons also include past averages and future projections.

QUESTIONS FOR ANALYSIS

The following questions are examples of the types employees must answer when analyzing the number of defects, and the resulting effect on production, over a period of time. Using Handout 1, answer each of the following questions.

1. What is the average number of total defects that occurred for the first eleven production periods of 1990? What is the average number of defects, by type of defect, for the first eleven production periods in 1990?

2. What three types of defects account for the most major defects during the spinning process?

3. In production period 11, what percentage of the defects resulted from light marks? slack and broken picks? other defects?

4. What was the average number of total defects for the third quarter of production for 1990? Was the average equal to, greater than, or less than the 1990 third quarter target?

5. One way of getting a clearer picture of production period defects is to construct a Pareto's analysis. A Pareto's analysis is done by breaking the total picture into its various components and constructing a graph to show what percentage each component is of the whole picture. Using the data from the 1990 Year to Date analysis, construct a Pareto's analysis to show the percentage breakdown of each type of defect.

ANSWER KEY

1. This question can be answered in one of two ways. The first method is to look at the 90 YTD or 1990 Year to Date average. By looking at this column, you can see that the average number of total defects for the first eleven production periods is 12.

   The second method which can be used to compute the average number of total defects is to add the number of defects for the eleven production periods and then divide by the number of periods, eleven. The number of defects by production period is

   Period 1 = 13
   Period 2 = 11
   Period 3 = 12
   Period 4 = 11
   Period 5 = 11
   Period 6 = 13.
   Period 7 = 11
   Period 8 = 12
   Period 9 = 14
   Period 10 = 13
   Period 11 = 11.

   Adding the number of defects for each period, we get

   13 + 11 + 12 + 11 + 11 + 13 + 11 + 12 + 14 + 13 + 11 = 132.

   Dividing the total, 132, by the number of periods, 11, we get

   132 ÷ 11 = 12.

   The average number of defects for the first eleven production periods is 12.

2. PART A

   The three sources that account for the most major defects in the spinning process are light marks, slack and broken picks, and other.

   PART B

   To answer Part B of the questions, examine the 90 YTD column of the graph. By looking at this column, we find the average number of defects resulting from light marks is 4; the average number of defects resulting from slack and broken picks is 2; and the number of defects from other sources is 3.

3. To compute the percentages of defects occurring from light marks, slack and broken picks, and other sources, we must first determine the number of defects from each source. For production period 11, the number of defects from light marks is 5; the number of defects from slack and broken picks is 2, and the number of defects from other sources is 2.5.

   Percentages are computed as follows:

   Light Marks $\frac{5}{11} \text{ X } 100 = .4545 \text{ X } 100 = 45.5\%$;

   Slack and Broken Picks $\frac{2}{11} \text{ X } 100 = .1818 \text{ X } 100 = 18.2\%$;

   Other Sources $\frac{2.5}{11} \text{ X } 100 = .2272 \text{ X } 100 = 22.7\%$.

4. To compute the average number of total defects for the third quarter of production for 1990, we must use production periods 7, 8, and 9. The number of defects for production period 7 is 13; the number of defects for production period 8 is 12; and the number of defects for production period 9 is 14. The total number of defects for the third quarter is

   $$13 + 12 + 14 \text{ or } 39.$$

   The average number of defects for the third quarter is

   $$39 \div 3 \text{ or } 13.$$

   The 1990 third quarter target was 14 defects. The average number of defects for the third quarter was 13. The average number of defects for the third quarter was less than the third quarter target.

5. A Pareto's analysis is a breakdown of the entire picture into its components. In order to give a percentage breakdown for each type of defect in the 1990 Year to Date column, we must determine the number of defects by category. The number of defects by category is as follows:

Light Marks	4
Slack and Broken Picks	3
Heavy Marks	1
Yarn Defects	.5
Split Ends	.25
Jerk in Waste	.25
Other	3

Percentages by category are

Light Marks $\frac{4}{12} \times 100 = .333 \times 100 = 33.3\%$;

Slack and Broken Picks $\frac{3}{12} \times 100 = .25 \times 100 = 25\%$;

Heavy Marks $\frac{1}{12} \times 100 = .083 \times 100 = 8.3\%$;

Yarn Defects $\frac{.5}{12} \times 100 = .042 \times 100 = 4.2\%$;

Split Ends $\frac{.25}{12} \times 100 = .021 \times 100 = 2.1\%$;

Jerk in Waste $\frac{.25}{12} \times 100 = .021 \times 100 = 2.1\%$;

Other $\frac{3}{12} \times 100 = .25 \times 100 = 25\%$.

The Pareto's Analysis

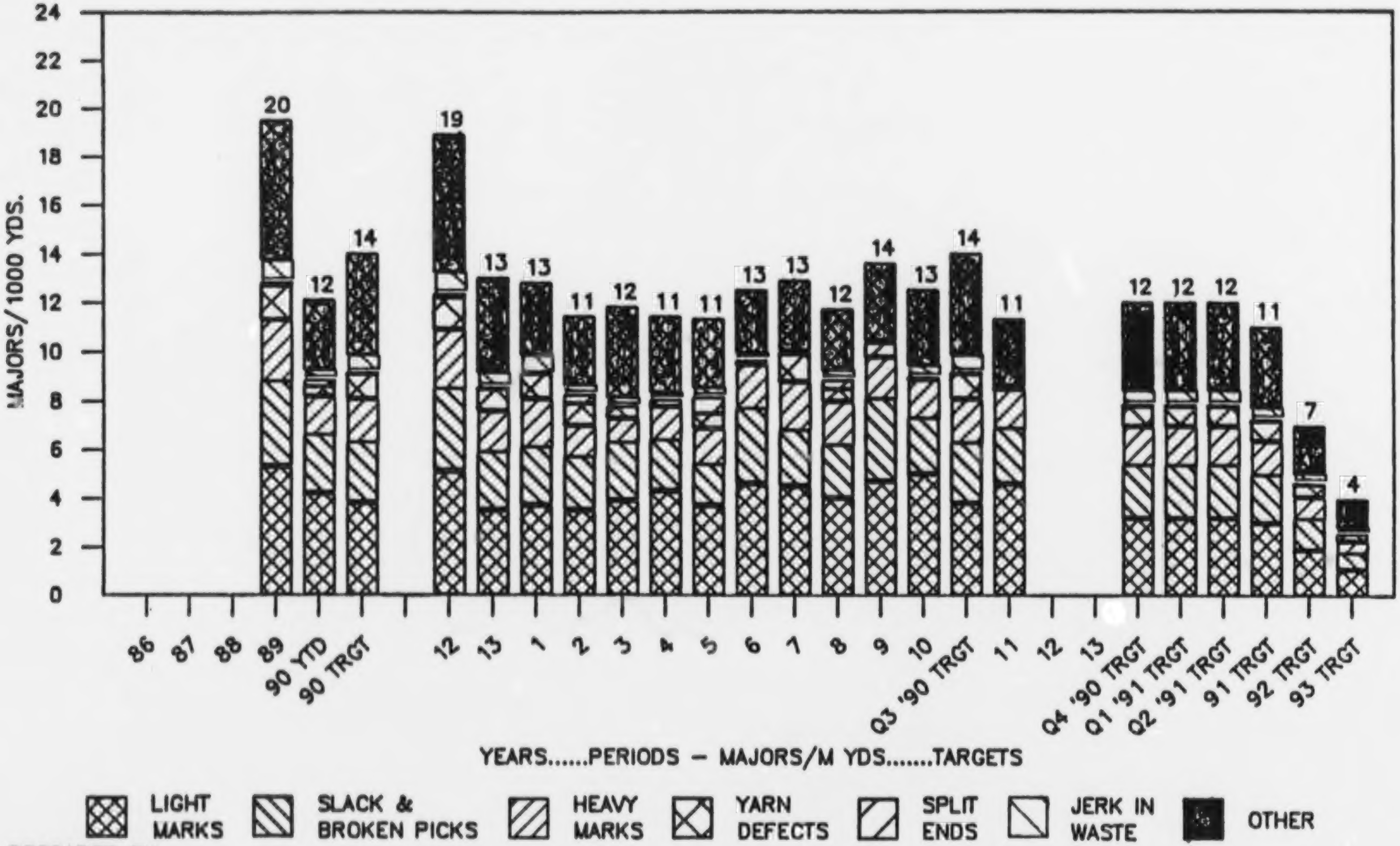
```
                   |
D       Light      |
E       Marks      |XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX (33.3%)
F                  |
E       Broken/    |
C       Slack      |
T       Picks      |XXXXXXXXXXXXXXXXXXXXXXXXX (25%)
S                  |
        Heavy      |
        Marks      |XXXXXXXX (8.3%)
                   |
        Yarn       |
        Defects    |XXXX (4.2%)
                   |
        Split      |
        Ends       |XX (2.1%)
                   |
        Jerk in    |
        Waste      |XX (2.1%)
                   |
        Other      |XXXXXXXXXXXXXXXXXXXXXXXXX (25%)
                   |
                   |__________________________________________________
                             10        20        30        40        50

                                   PERCENTAGE
```

APPENDIX

HANDOUT 1

QUALITY OF FIRST QUALITY

MAJOR DEFECTS/1000 YDS. – SPUN FILLING



PREPARED BY:
PRESENTED BY:
DATE: PERIOD 11 – 1990

MATHEMATICS FOR THE WORKPLACE

APPLICATIONS FROM VETERINARY TECHNOLOGY

A TEACHER'S GUIDE

Developed by:

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(December 1990)

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BEST COPY AVAILABLE

Activities of the Partnership for Academic and Career Education are supported primarily by funds awarded through the U.S. Department of Education, Fund for the Improvement of Postsecondary Education (FIPSE) and the S.C. Department of Education/Office of Vocational Education's Carl Perkins Sex Equity Program. However, the opinions and information presented in this material do not necessarily reflect the positions or policies of these entities, and no official endorsement by them should be inferred.

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INTRODUCTION

The workplace of tomorrow will require a skills level beyond the twelfth grade. Technological advances have necessitated higher levels of mathematical skills for employees to function efficiently in the workplace. Many employers need workers who can think creatively and use a variety of approaches in problem solving.

Because of the higher levels of mathematical skills needed to succeed in the workplace, now more than ever, there needs to be greater relevance between what is taught in the classroom and what transpires in the real world on a daily basis. Teaching skills in an isolated setting does little to motivate many students to take their studies seriously.

When information is presented in an isolated setting, students who are unable to see a connection between what is taught in the classroom and real-world applications may become disinterested in the subject. Consequently, students perceive no need to apply themselves to their studies and may not take courses which challenge them as learners.

Examples from real-life settings often help student better understand the need to study and learn mathematical skills taught in the classroom. Real-life applications can provide the needed relevance to motivate students, not only to apply themselves to their studies, but also to take the highest level of mathematics they are capable of handling successfully. **Mathematics for the Workplace: Applications from Veterinary Technology** is designed to present a real-world context where mathematics skills are used as part of a daily routine.

One intent of **Mathematics for the Workplace: Applications from Veterinary Technology** is to help students understand the significance of being able to convert from one system of measurement to a different system. An additional purpose is to help students see the need for making accurate calculations when working with fractions and decimals.

HOW TO USE THIS MODULE

The table of contents lists the sections contained in the module. This is a teacher's guide, not a packet of materials designed entirely to be duplicated and presented to students. **There are, however, several sections which need to be duplicated and given to the students so they can complete the assigned task.**

Pages 3-4 give students an introduction to the career field of veterinary technology. Included in this section is such information as a description of the career, job-related duties, working conditions, and high school preparation. **These pages should be duplicated and given to the students as introductory information.**

Pages 5-10 present a job-related task. In this section, students are given an explanation of the task and information to help them understand the need for the task. This section also provides teachers with an understanding of the requirements to complete the task. **This section may be duplicated and given to the students as information.**

Page 11 gives related problems to be solved by the students once the concepts have been covered in class. **These pages should be duplicated and given to students.**

Pages 12-24 include the answer keys to the **RELATED PROBLEMS.** Many o the answer keys have two sections because several of the problems can be answered in one of two ways.

DESCRIPTION OF CAREER

Veterinary technicians assist veterinarians and other scientists in capacities much like those of nurses and other medical technicians in the field of human medicine.

Veterinary technicians assume many technical duties and patient care responsibilities thereby enabling the veterinarian to concentrate on his areas of expertise, increase his patient case load, and expand the services provided for each patient.

Technicians should

- love animals and enjoy caring for them,
- like working with details and using set methods and procedures, and
- be able to combine compassion with objectivity.

Veterinary technicians receive training through two-year college and internship programs and must pass a state examination to become certified. The examination includes oral, written, and practical portions.

In South Carolina, veterinary technicians earned between $17,000 and $23,000 in 1988. Certified technicians may earn salaries beyond this range depending on training, experience, and place of employment.

JOB-RELATED DUTIES

Veterinary technicians may function as professional assistants to biomedical researchers and scientists as well as to veterinarians. Veterinary technicians are trained to assume responsibilities including

- physical therapy,
- biochemical analysis,
- clinical pathology,
- physical examinations,
- animal restraint, and
- appointments scheduling.

Additional duties include

- performing pre-anesthetic evaluations,
- calculating radiation dosage and exposure time,
- caring for hospitalized patients,
- conducting outpatient/field service, and
- managing the office and/or hospital.

Veterinary technicians work under the supervision of a veterinarian. However, if a technician proves reliable and responsible, he may receive little supervision while performing certain job duties.

WORKING CONDITIONS

Veterinary technicians usually work indoors in lighted and comfortable areas. Outdoor work may be required of technicians who are responsible for exercising animals or working with large animals.

Caring for animals can be dirty, repetitious, routine, and demanding work. The work may involve bites or scratches and exposure to infection.

Technicians generally work a 40-hour week. Evening, weekend, and holiday work may be required due to the fact that animals need food and care seven days a week. Overtime work may be required in the case of an emergency.

Employment opportunities for veterinary technicians may include

- private veterinary hospitals,
- pharmaceuticals,
- veterinary and medical research facilities,
- zoo/wildlife medicine, and
- colleges of veterinary medicine.

HIGH SCHOOL PREPARATION

In order to be best prepared for a program of studies in veterinary technology, a student should take algebra, biology, and chemistry courses.

ADDITIONAL INFORMATION

Students can obtain additional information on veterinary technology careers from school guidance offices, libraries, local veterinarians, or area technical colleges.

Colleges in South Carolina, Georgia, and North Carolina which offer Veterinary Technology programs are

Tri-County Technical College
Contact: Dr. Roseanne Marshall
Department Head
Veterinary Technology
P. O. Box 587
Pendleton, S.C. 29670

Fort Valley State College
Contact: Dr. K. L. Arora
Department Head
Veterinary Technology
State College Drive
Fort Valley, GA 31030

Central Carolina Community College
Contact: Dr. Alvin Mackay
Department Head
Veterinary Technology
1105 Kelley Drive
Sanford, NC 27330

INTRODUCTION OF THE TASK

One specific task veterinary technicians perform is determining the amount of antibiotic needed to counteract an infection within an animal's body. Animals, like humans, are given medication to fight infections.

When a veterinarian prescribes medication for a patient, it is the technician's responsibility to determine the dosage to be administered. The medication to be administered is usually in liquid form (milliliters), but the recommended dosage is based on a solid measure (milligrams per kilogram). Therefore, the technician must convert from a solid unit to a liquid unit of measure in order to obtain the correct amount of medication.

The amount of medication given to the patient is based on the patient's weight. The patient's weight is usually measured in pounds, but the recommended dosage is based on a weight measured by kilograms. It is the technician's responsibility to convert the number of pounds to an equivalent number of kilograms.

Once the number of kilograms is known, the technician can then determine the required amount of medication in milligrams. However, even though the technician knows the dosage amount in milligrams, he must convert this dosage to an equivalent amount measured in milliliters. When the recommended dosage in milliliters is known, the medication can then be given to the patient.

DETERMINING THE CORRECT DOSAGE

A client brought two pets (Fang, a cat, and George, a mouse) to the office. Fang is afraid of George, but George managed to bite Fang's ear. Fang then slapped George, resulting in a cut on George's head. Both the cat and the mouse need antibiotics.

The veterinarian prescribes Amoxicillin injectable for both animals. It is the laboratory technician's responsibility to determine the number of milliliters of Amoxicillin to be administered to each animal.

As with any type of injectable medication, Amoxicillin is measured in milliliters, which is a liquid measure. However, the recommended dosage is based on a certain number of milligrams per kilogram of weight for the animal.

In order to determine the amount of Amoxicillin to be administered to each animal, the weight in pounds must be converted to the equivalent weight in kilograms. The recommended dosage in milligrams must then be computed. This amount must then be converted to an equivalent amount in milliliters.

CONVERTING THE WEIGHTS

After weighing the animals, the technician finds the weights of the cat and mouse to be ten pounds and one-tenth pounds, respectively. In order to determine the amount of dosage, the number of pounds must be converted to an equivalent number of kilograms.

PROCEDURE A (DIVISION)

One way to convert from pounds to kilograms is to divide the number of pounds by 2.2 lbs/kg. One kilogram is approximately the same weight as 2.2 pounds.

Fang's weight is 10 pounds. Therefore, divide 10 pounds by 2.2 pounds per kilogram or

$$10 \text{ pounds} \div 2.2 \text{ lbs/kg} = 4.5 \text{ kg.}$$

George's weight is 0.1 pounds. Dividing 0.1 pounds by 2.2 lbs/kg gives

$$0.1 \text{ pounds} \div 2.2 \text{ lbs/kg} = .045 \text{ kg.}$$

PROCEDURE B (PROPORTION)

A second method of calculating an equivalent metric weight, given a standard weight, is to set up a proportion.

Setting up the proportion gives:

$$\frac{1\text{ kg}}{2.2\text{ lbs}} = \frac{x\text{ kg}}{10\text{ lbs}}.$$

Cross multiplication results in:

$$\text{'x' kg} \times 2.2\text{ lbs} = 10\text{ lbs} \times 1\text{ kg}.$$

Solving for 'x' gives:

$$\text{'x' kg} = \frac{1\text{ kg} \times 10\text{ lbs}}{2.2\text{ lbs}}$$

$$\text{'x' kg} = 4.5\text{ kg}.$$

A proportion can also be set up to determine George's weight.

$$\frac{1\text{ kg}}{2.2\text{ lbs}} = \frac{x\text{ kg}}{0.1\text{ lbs}}.$$

Cross multiplication results in:

$$\text{'x' kg} \times 2.2\text{ lbs} = 0.1\text{ lbs} \times 1\text{ kg}.$$

Solving for 'x' gives:

$$\text{'x' kg} = \frac{1\text{ kg} \times 0.1\text{ lbs}}{2.2\text{ lbs}}$$

$$\text{'x' kg} = 0.045\text{ kg}.$$

CALCULATING THE NECESSARY DOSAGE

Once the weight in kilograms is known, the technician can proceed with the process of determining the amount of medication needed.

The recommended dosage of Amoxicillin injectable is 22 mg/kg. This means for every kilogram of weight, the patient must receive 22 milligrams of medication.

Since Fang's weight is 4.5 kg, and since he must be given 22 mg for each kilogram of weight, the technician multiplies Fang's weight by the required dosage or

$$4.5 \text{ kg} \times 22 \text{ mg/kg} = 99 \text{ mg.}$$

The resulting product of 99 mg is the amount of medication required for Fang.

In the same way, the technician determines the amount of medication required by George. Multiplying George's metric weight by the recommended dosage, the technician gets:

$$0.045 \text{ kg} \times 22 \text{ mg/kg} = 0.99 \text{ mg.}$$

The resulting product of 0.99 mg is the amount of medication required for George.

Since the animals are receiving injectable Amoxicillin, the technician must now determine the corresponding number of milliliters for each recommended dosage before administering the medication.

CALCULATING THE AMOUNT TO BE ADMINISTERED

Injectable Amoxicillin contains 30 milligrams of medication per milliliter of solution. The number of required milliliters can be calculated in one of two ways.

PROCEDURE A (DIVISION)

The first way to compute the number of milliliters is to divide the required dosage, given in milligrams, by the number of milligrams per milliliter.

Since the recommended dosage for Fang is 99 mg, divide this amount by the number of milligrams per milliliter or

$$99 \text{ mg} \div 30 \text{ mg/ml} = 3.3 \text{ ml.}$$

The resulting quotient of **3.3 ml** is the amount of injectable Amoxicillin to be administered tO Fang.

The same process will give the amount of medication required for George. Dividing the recommended dosage, 0.99 mg, by the number of milligrams per milliliter gives

$$0.99 \text{ mg} \div 30 \text{ mg/ml} = 0.03 \text{ ml.}$$

The resulting quotient of **0.03 ml** is the amount of injectable Amoxicillin to be administered to Fang.

PROCEDURE B (PROPORTION)

Another method of calculating the required dosage in milliliters is to set up a proportion.

The proportion is:

$$\frac{30\ \text{mg}}{1\ \text{ml}} = \frac{99\ \text{mg}}{x\ \text{ml}}.$$

Cross multiplication results in:

$$\text{'x' ml} \times 30\ \text{mg} = 99\ \text{mg} \times 1\ \text{ml}.$$

Solving for 'x' gives:

$$\text{'x' ml} = \frac{99\ \text{mg} \times 1\ \text{ml}}{30\ \text{mg}}$$

$$\text{'x' ml} = 3.3\ \text{ml}.$$

The amount of medication required for Fang is 3.3 ml.

The proportion to determine the dosage for George is:

$$\frac{30\ \text{mg}}{1\ \text{ml}} = \frac{0.99\ \text{mg}}{x\ \text{ml}}.$$

Cross multiplication results in

$$\text{'x' ml} \times 30\ \text{mg} = 0.99\ \text{mg} \times 1\ \text{ml}.$$

Solving for 'x' gives:

$$\text{'x' ml} = \frac{0.99\ \text{mg} \times 1\ \text{ml}}{30\ \text{mg}}$$

$$\text{'x' ml} = 0.03\ \text{ml}.$$

The amount of medication required for George is 0.03 ml.

COMMUNICATIONS FOR THE WORKPLACE

APPLICATIONS FROM CRIMINAL JUSTICE TECHNOLOGY

A TEACHER'S GUIDE

Developed by:

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APPENDIX A

Completed search warrant
Blank search warrant

INTRODUCTION

The workplace of tomorrow will require a skills level beyond the twelfth grade. Technological advances have necessitated higher levels of communication skills for employees to function efficiently in the workplace. Many employees need workers who can be clear and concise in written communications.

Because of the higher levels of communication skills needed to succeed in the workplace, now more than ever, there needs to be greater relevance between what is taught in the classroom and what transpires in the real world on a daily basis. Teaching skills in an isolated setting does little to motivate many students to take their studies seriously.

When information is presented in an isolated setting, students who are unable to see a connection between what is taught in the classroom and real-world applications may become disinterested in the subject. This disinterest usually results in a lack of motivation. Consequently, students perceive no need to apply themselves to their studies and may not take courses which challenge them as learners.

This module is designed to provide a real-world context where written communication skills are used as part of a daily routine. Examples from real-life settings often help students better understand the need to study and learn communication skills taught in the classroom. Real-life applications can provide the needed relevance to motivate students, not only to apply themselves to their studies, but also to take the highest level of English they are capable of handling successfully.

The context for this module is the human service area of criminal justice or, more specifically, law enforcement officers. One intent of the module is to help students understand the significance of written communication skills in trying to obtain a specific request. An additional purpose is to help students see the need for being as concise and specific as possible when completing documents as part of job requirements.

HOW TO USE THIS MODULE

The table of contents lists the sections contained in the module. This a teacher's guide, not a packet of materials designed entirely to be duplicated and presented to the students. There are, however, several sections which need to be duplicated and given to the students so they may complete the assigned task.

Pages 3 - 5 give students an introduction to the career field of law enforcement. Included in this section is such information as duties of law officers, working conditions, and high school preparation. These pages should be duplicated and given to the students as introductory information.

Pages 6 - 8 present a job-related task. In this section, students are given an explanation of the task and information to help them understand the need for the task. This section also provides teachers with an understanding of the requirements to complete the task. This section may be duplicated and given to the students as information.

Page 9 is a glossary of related terms.

Pages 10 - 14 give supplemental materials students will need to complete the task. Included in this section are an addendum to the video and a written statement by one of the individuals portrayed in the video. The addendum and statement must be duplicated and given to the students.

These materials should be handed out after the students have viewed the video. A description of the video is given on page 8.

INTRODUCTION TO LAW OFFICERS

Police officers are authorized to protect the citizens of our country and perform public services for the community. These services include

- protecting the life and property of individuals or groups;
- preventing crimes against individuals;
- maintaining the peace;
- assuring public order through implementation of the laws of local, state, and national governments.

Officers should like working with people, data, and objects. Since officers are working with the prevention of crimes, the chance of injury is greater than in most occupations.

Special requirements

Special requirements for prospective law officers include

- being between 21 and 35 years of age at the beginning of their careers;
- passing written, physical, and psychological tests;
- meeting minimum weight and height requirements (These requirements may be waived in certain cases);
- undergoing character and background investigations.

Training between 18 and 21 years of age

Individuals between the ages of 18 and 21 who wish to become police officers may be able to work as police cadets. As police cadets individuals gain valuable experience in the daily routines of police officers. Duties cadets perform include

- writing parking tickets;
- directing traffic;
- keeping records.

Police cadets are exposed to all aspects of police work with the exception of making arrests.

Police cadet programs are local options and not all local law enforcement agencies have cadet programs. Individuals should contact the local law enforcement agency to find out if it has a cadet program.

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Duties of law officers

Law officers perform a range of duties depending upon where they are assigned. Duties include, but are not limited to

- writing and filing daily activity reports;
- patrolling assigned routes;
- investigating crimes;
- inspecting crime scenes for evidence;
- assisting in the preparation of court cases.

Working conditions

Law officers work in highly structured environments. Officers may work alone, with a partner, or as part of a team. Agents working outdoors may have to spend long periods of time in various types of weather.

Police officers usually work an eight-hour day/forty-hour week. Officers frequently work rotating shifts. The weekly schedule may vary from forty to sixty hours per week, depending upon the need. Officers may be called to report to work at any time and may have to work overtime in case of an emergency.

Detectives and special agents

Detectives and special agents are plainsclothes investigators who gather information for criminal cases. Special agents may be employed by the Federal Bureau of Investigations (FBI); the U.S. Secret Service; the Internal Revenue Services (IRS); or other divisions of the U.S. Government.

FBI agents' investigate bank robberies, organized crime, kidnapings, espionage, and terrorism.

Secret Service agents provide protection for the President, Vice-President, foreign dignitaries, and presidential candidates and investigate counterfeiting and the fraudulent use of credit cards.

IRS agents collect evidence against individuals and companies evading the payment of federal taxes.

How to prepare in high school

In order to best prepare for a program of studies in criminal justice or law enforcement while in high school, students should take math, English, social studies, and computer courses.

Students can obtain additional information on criminal justice careers from school guidance offices, libraries, area colleges or the local police/sheriff departments.

Criminal justice programs are offered at the following colleges:

GREENVILLE TECHNICAL COLLEGE
Contact: Joe Timmerman
Department Head
Criminal Justice
Greenville Technical College
South Pleasantburg Drive
Greenville, SC 29606
803-242-3170

PIEDMONT TECHNICAL COLLEGE
Contact: Robert Young
Department Head
Criminal Justice
Piedmont Technical College
Drawer 1467
Greenwood, SC 29648
803-233-8357

TRI-COUNTY TECHNICAL COLLEGE
Contact: Lew Holton
Department Head
Criminal Justice
Tri-County Technical College
P. O. Box 587
Pendleton, SC 29670
803-646-8361

Earnings and advancements

In South Carolina, police officers earned between $11,000 and $29,000 annually in 1988. State Highway Patrol Officers earned between $18,000 and $27,000 annually in 1988. Earnings will vary depending upon the level of education attained, the years of experience as an officer, the level of responsibility, and the town or area in which an officer works.

However, individuals with college degrees, either a two-year or four-year degree, have a greater chance of being hired and promoted than do those individuals with only high school diplomas.

UNDERSTANDING THE TASK

One specific task a law officer may perform is obtaining a search warrant from a local magistrate or judge. A search warrant is usually obtained before police officers enter a residence to seek property which may be connected to a crime or is in direct violation of laws.

Search warrants must describe the property being sought and the premises to be searched. The description must be as detailed and specific as possible. Physical descriptors, as well as the correct address, should be included because the person executing the warrant may not be the individual who obtained the warrant. Failure to provide accurate information may result in the wrong residence being searched or an individual being falsely arrested for committing a crime.

The most important section of a warrant is the part explaining why it is being requested. In this section, the office must explain why he believes the property being sought may be found at the location in question. The officer must also present a basis of knowledge for the request.

A basis of knowledge is the information upon which the request for the warrant is being founded. This information could be from an informant or the result of a surveillance.

After the basis of knowledge has been established, the officer must establish the reliability of the source of information. Reliability of the the source refers to the accuracy and dependability of the source. Is the source trustworthy or is the information based upon hearsay? If the reliability of the source cannot be established, the magistrate or judge may refuse to issue the warrant.

STUDENTS SHOULD REMEMBER! No vague information can be presented in the warrant. The information must be so clear that any reasonable individual who reads the warrant would believe the property being sought is located on the premises under suspicion.

Need for the task

Each citizen of the United States is provided certain rights by the Constitution. Of these rights, one is protection from unlawful search and seizure. Because of this guarantee, officers of the law must obtain a search warrant before entering the private residence of an individual.

Searching property without a detailed warrant may result in the evidence found being disqualified in a trial. Also, if the search warrant is not properly administered, the accused, even though he may have committed a crime, may be freed because of a legal technicality in the search process.

Introducing the lesson

One way to create student interest in the module is to center a class discussion around students' thoughts concerning the right of officials to search private citizens' property. Students could be asked how they feel about having their lockers searched for illegal substances. Hopefully one of the students will mention the use of a search warrant during the discussion.

Once a search warrant has been mentioned, the teacher can then center the discussion around the use of search warrants. Students could be asked to list what types of information they think should be included on a search warrant. All of this general information could be listed on the blackboard.

After listing the types of information on the board, the teacher could focus the discussion on such things as the amount of detail contained in the warrant, the basis for the information presented in the warrant, and the reliability of the source.

Once the preliminary discussions have been completed, the video should be shown. (See page 8 for a description of the video.) **After students have watched the video, the accompanying statement and addendum should be given to the students.** (The statement and addendum are found on pages 10-14). Using the information from the video and the handouts, students should be able to complete the task of accurately completing a sample search warrant.

The teacher should stress that the information presented in the warrant must be complete and detailed so that any reasonable person, after reading the warrant, would believe the property being sought is located at the premises described.

APPENDIX A contains a blank search warrant, which must be duplicated and presented for the students to complete and a completed warrant for the teacher to use as a guide.

Description of the video

Narcotics agents have been concerned about the manufacture and distribution of illegal substances in the local community. Agents believe local companies, unknowingly, are supplying chemicals needed to manufacture the substances.

The accompanying video sets up a scenario where local narcotics agents have been keeping local chemical companies under surveillance. One day two individuals were seen picking up several boxes from a local chemical company. One of the boxes was marked "corrosive." The pair was followed until they returned to the residence of one of the individuals and placed the materials in a shed adjoining the house.

GLOSSARY

Addendum	An addition
Affidavit	A written statement
Basis of Knowledge	The information upon which a law officer is basing his request for a search warrant
Diligence	Taking great care and effort to perform a task
Executing	Performing an assigned responsibility
Informant	Any individual who provides information to the police
Issuance	Giving out
Magistrate	A citizen appointed to carry out the laws of the local, state, and/or national governments
Pursuant	According to the given directions
Reliability of the Source	The dependability of the person(s) who provided information to the police
Scenario	The conditions under which a crime occurred
Surveillance	Watching an individual or a group very closely

BACKGROUND INFORMATION/ADDENDUM TO VIDEO

Shortly after leaving the residence, the vehicle was stopped for a traffic violation. At that time, it was discovered that the driver, Randy Ray Howard, was driving under suspension. It was also discovered that there was an outstanding warrant on file for the passenger, Rober Angel. Both individuals were taken into custody. Randy Ray Howard wa interviewed about his involvement with Robert Angel and about the activities that Narcotics officers had observed earlier. During that interview, Randy Ray Howard made the following (attached) statement.

VOLUNTARY STATEMENT

DATE May 12, 1990 PLACE Metro Narcotics Headquarters TIME STARTED 2:00 P.M.

I, the undersigned, Randy Ray Howard, am 27 years of age, my date a[illegible] of birth being the 25th day of August 19 62 at Butte, Montana

I now live at 1429 Oak Street, Cooperville, South Carolina

Before answering any questions or making any statements, Agent M. J. Matthews

a person who identified himself as a Special Agent of the Narcotics Task Force duly warned and advised me, and I know and understand that I have the following rights: That I have the right to remain silent and I do not have to answer any questions or make any statements at all; that any statement I make can and will be used against me in a court or courts of law for the offense or offenses concerning which the following statement is hereinafter made; that I have the right to consult with a lawyer of my own choice before or at anytime during any questioning or statements I make; that if I cannot afford to hire a lawyer, I may request and have a lawyer appointed for me by the proper authority, before or at anytime during any questioning or statements that I make, without cost or expense to me; that I can stop answering any questions or making any statements at any time that I choose, and call for the presence of a lawyer to advise me before continuing any more questioning or making any more statements, whether or not I have already answered some questions or made some statements.

I do not want to talk to a lawyer, and I hereby knowingly and purposely waive my right to remain silent, and my right to have a lawyer present while I make the following statement to the aforesaid person, knowing that I have the right and privilege to terminate any interview at any time hereafter and have a lawyer present with me before answering any more questions or making any more statements, if I choose to do so.

I declare that the following voluntary statement is made of my own free will without promise of hope or reward, without fear or threat of physical harm, without coercion, favor or offer of favor, without leniency or offer of leniency, by any person or persons whomsoever.

Q. What were you and Angel planning on doing with the stuff you picked up at RJM Labs?

A. Well, you know, man - we were going to make some crank.

Q. Methamphetamine?

A. Whatever.

Q. Methamphetamine?

A. Alright. Methamphetamine.

Q. What did you pick up at the lab?

A. Just some chemicals and lab equipment.

Q. Okay, Ray - listen. You said you wanted to cooperate. You said you got roped into this whole deal. Now I'm willing to listen to your side of the story, but I know you're not a stupid man, so how about just cut the crap with these vague answers. What kind of chemicals? What kind of lab equipment?

A. Alright. We picked up phenylacetacetic acid, acetic anhydride, methylanine, and some concentrated hydrochloric acid.

Q. Whoa! Slow down. How do you spell those?

A. Hey - I'm a chemist, not a spelling bee champion. I don't know. Look 'em up.

Q. What else? What kind of equipment?

A. A coupie of large beakers. A reflux condenser. Oh, and a reflux apparatus.

Q. Is that it?

A. Yeah.

Q. Is that all you need to make the stuff?

A. No, but we already had some stuff in the shed at the house.

END OF PAGE 1

I have read each page of this statement consisting of 4 page(s), each page of which bears my signature, and corrections, if any, bear my initials, and I certify that the facts contained herein are true and correct. I further certify that I made no request for the advice or presence of a lawyer before or during any part of this statement, nor at any time before it was finished did I request that this statement be stopped. I also declare that I was not told or prompted what to s[illegible]n this statement.

This statement was completed at 2:30 P.M. on the 12th day of May [illegible]0

WITNESS: MJ. Mathews

WITNESS:

Randy Ray Howard

Signature of person giving voluntary statement

VOLUNTARY STATEMENT

DATE May 12, 1990 PLACE Metro Narcotics Headquarters TIME STARTED 2:00 M.

I, the undersigned, Randy Ray Howard, am 27 years of age, my date and place of birth being the 25th day of August 19 62 at Butte, Montana

I now live at 1429 Oak Street, Cooperville, South Carolina

Before answering any questions or making any statements, Agent M. J. Matthews

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I declare that the following voluntary statement is made of my own free will without promise of hope or reward, without fear or threat of physical harm, without coercion, favor or offer of favor, without leniency or offer of leniency, by any person or persons whomsoever.

Q. Angel's house?

A. Yeah.

Q. What else was in the shed?

A. Some of the same stuff; but we needed more. Oh, and some formic acid.

Q. Did all of that come from the same supply house?

A. I don't know. Angel already had that stuff before I got there.

Q. So what were the other stops for?

A. What other stops?

Q. After the two of you left RJM Labs today, you stopped at a couple of other places.

A. Oh. No, we were trying to see about some ether.

Q. So how did you get hooked up with Angel?

A. Another guy introduced me.

Q. Introduced you? Why? You decide to do a little moonlighting?

A. No. I told you, I didn't want anything to do with this. I didn't have any choice, though.

Q. What do you mean, you had no choice?

A. I owed this guy some money.

Q. Why? What guy?

A. I don't know his whole name. Everybody just calls him Muldoon. He's a bookie. I really got in over my head and owed him some big bucks. There was no way I could pay.

Q. Okay. And ...?

A. He told me I could work it off.

END OF PAGE 2

I have read each page of this statement consisting of 4 page(s), each page of which bears my signature, and corrections, if any, bear my initials, and I certify that the facts contained herein are true and correct. I further certify that I made no request for the advice or presence of a lawyer before or during any part of this statement, nor at any time before it was finished did I request that this statement be stopped. I also declare that I was not told or prompted what to say in this statement.

This statement was completed at 2:30 P.M. on the 12th day of May 1990

WITNESS: M. J. Matthews

WITNESS:

Randy Ray Howard

Signature of person giving voluntary statement

VOLUNTARY STATEMENT

DATE May 12, 1990 PLACE Metro Narcotics Headquarters TIME STARTED 2:00 [illegible].M.

I, the undersigned, Randy Ray Howard, am 27 years of age, my date [illegible]ce of birth being the 25th day of August 19 62 at Butte, Montana

I now live at 1429 Oak Street, Cooperville, South Carolina

Before answering any questions or making any statements, Agent M. J. Matthews

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I declare that the following voluntary statement is made of my own free will without promise of hope or reward, without fear or threat of physical harm, without coercion, favor or offer of favor, without leniency or offer of leniency, by any person or persons whomsoever.

Q. The debt?

A. Yeah. He said he knew a guy who needed a chemist who could keep his mouth shut. He said the guy would pay off my markers if I'd do one job for him.

Q. Work in his crank lab?

A. Well, I didn't know that then. I mean, he didn't come right out and say it. But I figured it was something like that.

Q. So what happened?

A. I didn't know what else to do. I told Muldoon I'd meet the guy. He set it up and I met him about a week ago.

Q. Angel?

A. Yeah.

Q. What happened at the meeting?

A. We just talked. He was kind of careful at first; he just sort of hinted at what he wanted. Finally he opened up and told me that the deal between him and Muldoon was done and that I worked for him now. He told me to meet him again in a few days.

Q. Then what?

A. I met him again. We went to his house and I saw the lab and what he had on hand.

Q. This is Angel's house, right? You know the address?

A. Yeah. 1906 Palmetto Drive.

Q. What did you do then?

A. I told him what I'd need to do the job. He said we'd make the rounds today - this morning - and pick up everything and get started. That's what we were doing when you busted us.

END OF PAGE 3

I have read each page of this statement consisting of 4 page(s), each page of which bears my signature, and corrections, if any, bear my initials, and I certify that the facts contained herein are true and correct. I further certify that I made no request for the advice or presence of a lawyer before or during any [illegible] of this statement, nor at any time before it was finished did I request that this statement be stopped. I also declare that I was not told or prompted what to [illegible] statement.

This statement was completed at 2:30 P.M. on the 12th day of May 19 90

WITNESS: M. J. Matthews

WITNESS:

Signature of person giving voluntary statement

VOLUNTARY STATEMENT

DATE May 12, 1990 PLACE Metro Narcotics Headquarters TIME STARTED 2:00 P.M.

I, the undersigned, Randy Ray Howard, am 27 years of age, my date and place of birth being the 25th day of August 19 62 at Butte, Montana

I now live at 1429 Oak Street, Cooperville, South Carolina

Before answering any questions or making any statements, Agent M. J. Matthews

a person who identified himself as a Special Agent of the Narcotics Task Force duly warned and advised me, and I know and understand that I have the following rights: That I have the right to remain silent and I do not have to answer any questions or make any statements at all; that any statement I make can and will be used against me in a court or courts of law for the offense or offenses concerning which the following statement is hereinafter made; that I have the right to consult with a lawyer of my own choice before or at anytime during any questioning or statements I make; that if I cannot afford to hire a lawyer, I may request and have a lawyer appointed for me by the proper authority, before or at anytime during any questioning or statements that I make, without cost or expense to me; that I can stop answering any questions or making any statements at any time that I choose, and call for the presence of a lawyer to advise me before continuing any more questioning or making any more statements, whether or not I have already answered some questions or made some statements.

I do not want to talk to a lawyer, and I hereby knowingly and purposely waive my right to remain silent, and my right to have a lawyer present while I make the following statement to the aforesaid person, knowing that I have the right and privilege to terminate any interview at any time hereafter and have a lawyer present with me before answering any more questions or making any more statements, if I choose to do so.

I declare that the following voluntary statement is made of my own free will without promise of hope or reward, without fear or threat of physical harm, without coercion, favor or offer of favor, without leniency or offer of leniency, by any person or persons whomsoever.

Q. Did Angel already have any crank at his house or in the shed when you went there?

A. Yeah. He offered me some at his house. I didn't do any.

Q. You didn't do anything while you were there?

A. Well, I might have had one joint; but I don't do crank or coke or anything.

Q. Wonderful. You're a credit to the community. Who else is there today? At the house?

A. Angel's wife, Danita, and some other guy. I think his name is Glenn.

Q. Okay. Is that it? Anything else you want to tell me?

A. That's pretty much it. So what do you think? I've been straight with you. You think it'll help me?

Q. Ray - I told you before - no promises. I can't make any deals. But I'll certainly tell the Solicitor and the judge that you were cooperative, and that I think you've been straight with us. Anything else?

A. No. I guess that's it.

***** END OF STATEMENT *****

I have read each page of this statement consisting of 4 page(s), each page of which bears my signature, and corrections, if any, bear my initials, and I certify that the facts contained herein are true and correct. I further certify that I made no request for the advice or presence of a lawyer before or during any part of this statement, nor at any time before it was finished did I request that this statement be stopped. I also declare that I was not told or prompted what to say in this statement.

This statement was completed at 2:30 P.M. on the 12th day of May 19 90

WITNESS: M. J. Matthews

WITNESS:

Randy Ray Howard
Signature of person giving voluntary statement

JPS/CC

APPENDIX A

STATE OF SOUTH CAROLINA

COUNTY OF Cooper

SEARCH WARRANT

Form Approved by
S.C. Attorney General
Section 17-13-160
March 15, 1978

TO ANY BONDED LAW ENFORCEMENT OFFICER OF THIS STATE OR COUNTY OR OF THE MUNICIPALITY

OF Cooperville

It appearing from the attached affidavit that there are reasonable grounds to believe that certain property subject to seizure under provisions of Section 17-13-140, 1976 Code of Laws of South Carolina, as amended, is located on the following premises:

DESCRIPTION OF PREMISES (PERSON, PLACE OR THING) TO BE SEARCHED

The premises to be searched are a house and adjoining buildings located at 1906 Palmetto Drive, Cooperville, SC. The lower portion of the house is brown brick. The upper portion of tne house is siding, which is painted beige. The wrought iron pieces on the front of the house are also painted beige. The trim work for the house is brown.

Now, therefore, you are hereby authorized to search the subject premises for the property described below, and to seize such property if found:

DESCRIPTION OF PROPERTY

The property being sought is chemicals used in the production of methamphetamines. The specific chemicals being sought are formic acid, phenylacetacetic acid, acetic anhydride, methylamine, hydrochloric acid, and ether. Lab equipment needed to make the substances is also being sought. Specific lab equipment includes beakers, a reflex condenser, and reflux apparatus. Other materials being sought include methamphetamines and other lab equipment used in the production of methamphetamines.

This Search Warrant shall not be valid for more than ten days from the date of issuance.

A written inventory of all property seized pursuant to this Search Warrant shall be made to

Bobby R. Floyd

within ten days from the date of this warrant, such inventory to be signed by the officer executing this warrant, and a copy of such inventory shall be furnished to the person whose premises are searched if demand for such copy is made.

A copy of this Search Warrant shall be delivered to the person in charge of the premises searched at the time of such search if practicable, and, if not, to such person as soon thereafter as is practicable; in the event the identity of the person in charge is not known or if such person cannot be found after reasonable diligence in attempting to locate the person, a copy shall be attached to a prominent place on such premises.

Cooperville, S.C.

May 1, 19 90

Bobby R Floyd (L.S.)
Signature of Judge

STATE OF SOUTH CAROLINA

COUNTY OF Cooper

AFFIDAVIT

Personally appeared before me, one M.J. Matthews who, being duly sworn, says that there is probable cause to believe that certain property subject to seizure under provisions of Section 17-13-140, 1976 Code of Laws of South Carolina, as amended, is located on the following premises in this County:

DESCRIPTION OF PROPERTY SOUGHT

Property being sought is methamphetamines and chemicals and lab equipment used in the production of methamphetamines. Included are formic acid, hydrochloric acid, phenylacetic acid, acetic anhydride, methylamine, beakers, a reflex condenser, and reflux apparatus.

DESCRIPTION OF PREMISES (PERSON, PLACE OR THING) TO BE SEARCHED

The property to be searched is a brick house located at 1906 Palmetto Drive, Cooperville, SC. The lower portion of the house is brown brick, while the upper portion is siding painted beige. The wrought iron work on the front of the house is also painted beige. Adjoining buildings will also be searched.

REASON FOR AFFIANT'S BELIEF THAT THE PROPERTY SOUGHT IS ON THE SUBJECT PREMISES

The belief that the property being sought is on the subject premises is based upon a voluntary statement of Randy Ray Howard and information gained through police surveillance. Randy R. Howard, in a voluntary statement to narcotics agents, personally observed the items mentioned on the front of this warrant as being located at the subject premises. Narcotics agents noted several boxes being loaded into the car of Randy Ray Howard at RJM Chemical Laboratories. Randy Ray Howard, the driver of the car and a chemist, is fully aware of what the chemicals are and their intended use.

Sworn to and Subscribed before me
this First day of May 19 90.

Bobby R. [illegible] (L.S.)
Signature of Judge

M J Matthews
Affiant

Address 105 West First Street
Cooperville, SC 29000

Phone 555-6432

RETURN

I received the attached Search Warrant May 1, 19 90, and have executed it as foll

On May 1, 19 90 at 3:00 o'clock p. M, I searched

(the person) described in the warrant and (the premises)

I left a copy of the warrant with Mrs. Danita Angel

Name of person searched or "at the place of search" with.

Together with a receipt for the items seized.

The following is an inventory of property taken pursuant to the warrant:

The following items and the listed quantities were found in a small building next to the residence of Robert Angel.

Methamphetamines 50 pills

formic acid - one liter

hydrochloric acid - 500 ml

phenylacetacetic acid - one liter

acetic anhydride - 250 ml

methylamine - 1 liter

beakers 10 (various sizes)

reflex condenser 1

reflux apparatus 1

This inventory was made in the presence of M J Matthews

AND J M Wallace

I swear that this Inventory is a true and detailed account of all the property taken by me on the warrant.

SWORN to before me this 1st

day of May, 19 90

Bobby R Floyd (L.S.)

Signature of Judge

C L Holton

(Signature of Officer Executing Warrant)

STATE OF SOUTH CAROLINA

County of *Cooper*

SEARCH WARRANT

Date *May 1, 1990*

Officer *M.J. Matthews*

STATE OF SOUTH CAROLINA

COUNTY OF ______________________

SEARCH WARRANT

Form Approved by
S.C. Attorney General
Section 17-13-160
March 15, 1978

TO ANY BONDED LAW ENFORCEMENT OFFICER OF THIS STATE OR COUNTY OR OF THE MUNICIPALITY

OF ____:

It appearing from the attached affidavit that there are reasonable grounds to believe that certain property subject to seizure under provisions of Section 17-13-140, 1976 Code of Laws of South Carolina, as amended, is located on the following premises:

DESCRIPTION OF PREMISES (PERSON, PLACE OR THING) TO BE SEARCHED

____

____

____

____

Now, therefore, you are hereby authorized to search the subject premises for the property described below, and to seize such property if found:

DESCRIPTION OF PROPERTY

____

____

____

____

____

____

____

This Search Warrant shall not be valid for more than ten days from the date of issuance.

A written inventory of all property seized pursuant to this Search Warrant shall be made to

____

within ten days from the date of this warrant, such inventory to be signed by the officer executing this warrant, and a copy of such inventory shall be furnished to the person whose premises are searched if demand for such copy is made.

A copy of this Search Warrant shall be delivered to the person in charge of the premises searched at the time of such search if practicable, and, if not, to such person as soon thereafter as is practicable; in the event the identity of the person in charge is not known or if such person cannot be found after reasonable diligence in attempting to locate the person, a copy shall be attached to a prominent place on such premises.

______________________________, S.C. 198

______________________________, 19 ____ ______________________________ (L.S.)

Signature of Judge

STATE OF SOUTH CAROLINA

COUNTY OF ____________________

AFFIDAVIT

Personally appeared before me, one ____________________ who, being duly sworn, says that there is probable cause to believe that certain property subject to seizure under provisions of Section 17-13-140, 1976 Code of Laws of South Carolina, as amended, is located on the following premises in this County:

DESCRIPTION OF PROPERTY SOUGHT

DESCRIPTION OF PREMISES (PERSON, PLACE OR THING) TO BE SEARCHED

REASON FOR AFFIANT'S BELIEF THAT THE PROPERTY SOUGHT IS ON THE SUBJECT PREMISES

Sworn to and Subscribed before me

this ________ day of ________ , 19 ____ .

____________________ (L.S.)

Signature of Judge

____

Affiant

Address ____________________

____

199

Phone ____________________

RETURN

I received the attached Search Warrant ____________________, 19 ____, and have executed it as follows:

On ____________________, 19 ____ at ____________________ o'clock ____ M, I searched

(the person) described in the warrant and (the premises)

I left a copy of the warrant with ____

Name of person searched or "at the place of search" with.

Together with a receipt for the items seized.

The following is an inventory of property taken pursuant to the warrant: ____________________

This inventory was made in the presence of ____

AND ____

I swear that this Inventory is a true and detailed account of all the property taken by me on the warrant.

SWORN to before me this ____________________

day of ____________________, 19 ____

____________________ (L.S.)

Signature of Judge

____

(Signature of Officer Executing Warrant)

STATE OF SOUTH CAROLINA

County of ____________________

SEARCH WARRANT

202

Date ____________________

Officer ____________________

201

MATHEMATICS FOR THE WORKPLACE

APPLICATIONS FROM RADIOLOGICAL TECHNOLOGY

A TEACHER'S GUIDE

Developed by:

Mr. Johnny M. Wallace and **Mrs. Gay Nichols**

Associate Director / Curriculum Developer
Partnership for Academic and Career Education

Director, Radiological Technology
Anderson Memorial Hospital

(January 1990)

Partnership for Academic and Career Education (PACE)
P. O. Box 587
Pendleton, SC 29670
(803-646-8361, ext. 2247)

Activities of the Partnership for Academic and Career Education are supported primarily by funds awarded through the U.S. Department of Education, Fund for the Improvement of Postsecondary Education (FIPSE) and the S.C. Department of Education/Office of Vocational Education's Carl Perkins Sex Equity Program. However, the opinions and information presented in this material do not necessarily reflect the positions of policies of these entities, and no official endorsement by them should be inferred.

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INTRODUCTION

This module provides an additional resource for teaching ratios and exponents using applications from the allied health field of Radiological Technology.

Teachers may use the module as supplemental material for such courses as General Math III, Technical/Applied Mathematics, or Algebra I.

An additional suggestion concerning the use of this module is to invite, when possible, a radiological technologist to speak to the class. The module could then be implemented as a follow-up activity for the next several days giving students an opportunity to work problems associated with a radiological technologist's job responsibilities.

Please keep in mind that the module developers offer these ideas only as suggestions. Each teacher and/or district should decide where the module best fits into the overall structure of the curriculum.

RATIONALE FOR THE UNIT

Many times students have difficulty relating concepts and theories presented in the classroom to real-life situations. This problem may occur when information is presented in an isolated setting. Therefore, students who are unable to see a connection between what is taught and a real-world applications may become disinterested in the subject or lose motivation. Consequently, the student perceives no need to apply himself to his studies and may not take courses which challenge him as a learner.

This module is designed to provide a real-world context where ratios and exponents are used as part of a daily routine. Providing examples from real-life settings helps students better-understand the need to study and to learn the mathematical concepts taught in the classroom. Real-life applications can provide the needed relevance to motivate students, not only to apply themselves to their studies, but also to take the highest level of mathematics they are capable of handling successfully.

HOW TO USE THIS MODULE

The table of contents in this packet lists the materials encompassed within the module. This is a teacher's guide, not a packet of materials designed entirely to be duplicated and presented to students. There are, however, several sections which should be duplicated and given to the students so they may complete the assigned tasks.

Pages 3 - 5 give the students an introduction to the career field of radiological technology. Included in this introduction is such information as the technologist's duties, where technologists work, and the necessary high school preparation. These pages should be duplicated and given to the students as introductory information.

Page 6 gives a brief description of one specific task performed by the radiological technologist and an explanation of the need for the task. This page can be duplicated and given to students as information.

Pages 7 - 10 explain the specific tasks being presented in the module. These pages can be duplicated and given to the students for them to follow along with the teacher during the explanation of the tasks to be performed.

Page 11 gives additional word problems to be solved by the students once the concepts have been covered in class. This page should be duplicated and given to the students.

Pages 12 - 26 include the answer keys to the Related Problems. Many of the answer keys have two sections because many of the problems require solving ratios which involve two different units of measure (such as feet and inches). In order to solve the problem, the same units of measure must be used. The answer key includes both ways of solving the problems. For example, if Method I uses inches as the unit of measure, then Method II will use feet as the unit of measure.

EXAMINING THE PROFESSION: *radiological technologist*

A radiological technologist assists a radiologist in the use of x-ray and imaging equipment in the diagnosis and treatment of disease or injury.

Radiological Technologists (RTs) must be accurate, skilled, and dedicated. RTs receive training through two or four-year colleges or hospital training programs. Because of the need for radiological technologists in the workplace, students who complete a two-year degree are hired as readily as students with a four-year college degree. Graduates of four-year college programs may have more opportunities to assume managerial positions than two-year college graduates, although advancements opportunities often result from a combination of such factors as education, experience, and job performance.

In order to become registered by the American Registry of Radiologic Technologists, RTs must satisfactorily complete formal training in a program approved by the American Medical Association. Students must pass the registry examination to practice radiological technology and to become nationally certified by the American Registry of Radiologic Technologists.

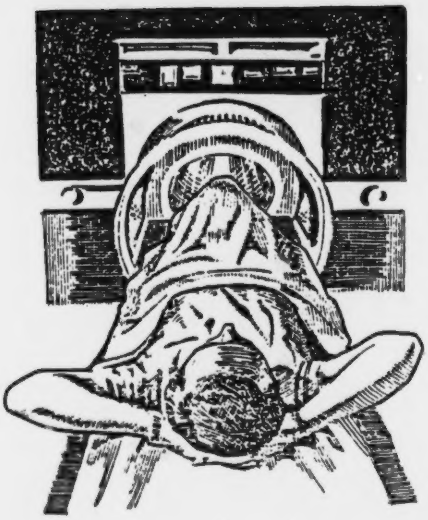
In South Carolina, RTs earned between $15,000 and $22,000 annually in 1988. Radiologic supervisors earned between $20,000 and $31,000 per year in 1988. On the national level, average salary for radiological technologists was $18,000 in 1988. The national average yearly salary for 1988 was $23,000.

Technologists should like:

- dealing with things and objects;
- having direct personal contact with people;
- activities of a scientific and technical nature.

A technologist should be able to:

- see detail in drawings;
- recognize differences in shapes or shadings;
- rate information according to standards that can be measured or checked.



Computer-aided tomography (CAT-SCAN) devices are just one of the machines radiological technologists now use in their daily activities.

Radiological technologists' duties

Radiological technologists perform such duties as:

- arranging devices which lessen discomfort and prevent the patient from moving;
- adjusting equipment to give a clear and accurate view of the patient's body;
- determining proper voltage, current, and exposure time for each x-ray;
- preparing and administering mixtures which patients may be required to take;
- judging the quality of a finished radiograph;
- keeping records and files of x-rays.

Working conditions

Most radiological technologists work in modern, well-equipped hospital radiology rooms. Others may work in medical laboratories or doctors' offices. Technologists usually work a 40-hour week. Evening, weekend, and holiday work as well as emergency duty may be required.

Technologists receive protection from dangerous radiation from leaded partitions, special protective clothing, and gloves.

How to best prepare in high school

In order to be well prepared to enter a program of study in radiological technology, students should take algebra, biology, and chemistry courses.

Students may also consider becoming a volunteer at the local hospital in order to gain understanding and exposure to various allied health careers.

Additional information

Students may receive additional information on radiological technology or other health careers from their high school guidance office, the local hospital, libraries, or through area technical colleges which offer radiological technology programs.

Area technical colleges and hospitals that offer radiological technology programs are:

Greenville Technical College
Contact: Andrew Clarke
Department Head
Radiologic Technology
S. Pleasantburg Drive
Greenville, SC 29606-5616
(803) 242 - 3170

Piedmont Technical College
Contact: Joyce Agner
Coordinator
Allied Health Careers
Drawer 1467
Greenwood, SC 29648
(803) 223 - 8357

Spartanburg Technical College
Contact: Dorothy Kiser
Department Head
Radiologic Technology
P. O. Drawer 4386
Spartanburg, SC 29305
(803) 591 - 3600

Anderson Memorial Hospital
Contact: Gaye Nichols
Program Director
Radiologic Technology
800 North Fant Street
Anderson, SC 29621
(803) 261 - 1249

Understanding the task

One task performed by a radiological technologist (RT) is determining the amount of radiation to administer to a patient and the distance the radiology source must be positioned from the patient. The RT must able to calculate exposure rate or distance correctly to determine how much exposure he/she is also receiving. This will assure that the technologist is not over exposed to radiation during the treatment process.

Why is there a need?

An incorrect distance or an incorrect amount of radiation exposure could result in:

- over exposure, which could cause harm to the patient.
- underexposure, which would not accomplish the desired results.
- harm to the technologist.

What is the task?

Technologists wear lead aprons but this does not prevent all x-rays from entering the technologist's body. In order to further reduce the amount of exposure, two additional exposure management processes can be used. The two processes are exposure time and the distance from the radiation source. By properly calculating either of these process, technologists can further reduce the amount of radiation the body is exposed to. In this module, students will learn how to calculate exposure time and distance.

Exposure

Exposure to a radiation source is directly related to time. The greater the exposure time, the greater the dosage of radiation the patient and/or technologist receives. Since exposure (dosage amount) is directly related to time, a proportion can be set up to determine the amount of time a technologist and/or patient should be exposed to a radiation source.

For example:

> If a technologist receives 40 units of radiation (rads) when working near a radiation source for one hour, how many rads will the technologist receive in 2 hours of exposure?

A direct relationship allows for use of a proportion to determine the amount of exposure in 2 hours.

The proportion for determining either exposure rate (dose) or time is:

$$\frac{\text{dose}(1)}{\text{dose}(2)} = \frac{\text{time}(1)}{\text{time}(2)}$$

Using this proportion we can now find the dose for time(2).

The given information is:

Dose(1) = 40 rads; Dose(2) = x;
Time(1) = 1 hour; Time(2) = 2 hours.

Setting up the proportion, we get:

$$\frac{40 \text{ rads}}{\text{'x' rads}} = \frac{1 \text{ hour}}{2 \text{ hours}}$$

Cross multiplying, we get:

$$40 \text{ rads} \times 2 \text{ hours} = \text{'x' rads} \times 1 \text{ hour.}$$

Solving for 'x', we get:

80 rads of exposure.

Maximum permissible dosage

In order not to damage his/her body, there is a maximum number of radiation units a technologist can be exposed to during a 40-hour work week. This amount, called the maximum permissible dose (MPD), is 100 units of radiation per 40-hour work week. In order to determine how many hours can be spent around a certain source, divide the MPD by the intensity of the source, which is expressed in units/hours.

EXAMPLE:

If a technologist is assigned to work in a nuclear medicine laboratory where the radiation intensity is 10 units/hours, how many hours can the technologist work in the lab during a given week and not exceed the MPD?

SOLUTION:

Since the MPD is 100 units per 40-hour work week, divide the number of units (100 units) by the intensity per hour (10 units/hour) of exposure. Dividing 100 by 10 we find the technologist can work only 10 hours per week in the lab.

Distance

Distance is how far away from the source the technologist or the patient is located.

The relation between radiation intensity and distance is radiation intensity varies inversely with the square of the distance. The more distance between the technologist or the patient and the source, the less radiation exposure. The less distance between the technologist or the patient and the source, the more radiation exposure.

Intensity varies inversely with the square of the distance because as the radiation leaves the x-ray tube it diverges and covers a larger area. Since area is always involved, the distance must be squared. (Remember--area is always measured in square units.)

Since distance and intensity vary indirectly a proportion can be used to calculate either intensity or distance. This proportion would be:

$$\frac{\text{intensity}(1)}{\text{intensity}(2)} = \frac{\text{distance}(2)^2}{\text{distance}(1)^2}$$

EXAMPLE

If the intensity of radiation at 40" is 300 rads, what would be the intensity at 20"?

SOLUTION

Using the ratio:

$$\frac{\text{intensity(1)}}{\text{intensity(2)}} = \frac{\text{distance(2)}^2}{\text{distance(1)}^2}$$

we can compute the intensity at 20".

The given information is:

distance(1) = 40"	intensity(1) = 300 rads
distance(2) = 20"	intensity(2) is unknown

Substituting into the proportion, we get:

$$\frac{300 \text{ rads}}{\text{'x' rads}} = \frac{(20'')^2}{(40'')^2}$$

Clearing the exponents, we get:

$$\frac{300 \text{ rads}}{\text{'x' rads}} = \frac{400 \text{ sq. in.}}{1600 \text{ sq. in.}}$$

Cross multiplying, we get:

$$300 \text{ rads} \times 1600 = \text{'x' rads} \times 400$$

Solving for 'x', we get:

$$\text{'x'} = \frac{300 \text{ rads} \times 1600}{400}$$

or

$$x = 1200 \text{ rads}$$

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Related Problems

1. What is the intensity of radiation at 2 1/2 feet if the intensity at 50" is 4 rads?

2. The radiation output at 6" from a radiation source is 200 rads per hour. Answer the following questions.

   a) How much radiation would the RT get if he stood at the 6" distance for 1 hour?

   b) How much radiation would he get if he stood at the same spot for only 30 minutes?

   c) How much radiation would he get if he stood 2′ away from the source for 1 hour?

   d) How much radiation would he get if he stood 3′ away for 30 minutes?

3. An x-ray tube has an output intensity of 2.5 rads at a distance of 6 feet. What would be the radiation exposure at 36" from the source?

4. A technologist receives 10 rads/hr. at a distance of two feet from the source of radiation. Will he exceed his hourly MPD if he moves to a distance 3 feet from the source? How far away from the source would the technologist need to be in order not to exceed the MPD?

5. A radiation source is emitting 20 rads/hr. at a distance of one foot. Which is safer...standing one foot from the source for 10 minutes or standing 3 feet from the source for one hour?

PROBLEM 1 ANSWER KEY

In order to correctly solve this problem, units of distance must be the same. The first step is to either convert 2 1/2 feet to inches or convert 30 inches to feet.

METHOD I

Using inches (2 1/2 ft. x 12 in./ft.) as our unit of measure, we get:

intensity(1) = 4 rads	distance(1) = 50 in.
intensity(2) = 'x' rads	distance(2) = 30 in.

The ratio involving intensity and distance is:

$$\frac{\text{intensity(1)}}{\text{intensity(2)}} = \frac{\text{distance(2)}^2}{\text{distance(1)}^2}$$

Substituting into the formula, we get:

$$\frac{4 \text{ rads}}{\text{'x' rads}} = \frac{(30 \text{ in.})^2}{(50 \text{ in.})^2}$$

Removing the square, we get:

$$\frac{4 \text{ rads}}{\text{'x' rads}} = \frac{900 \text{ sq. in.}}{2500 \text{ sq. in.}}$$

Solving for 'x', we get:

$$900x = 10{,}000$$
$$x = 11.1 \text{ rads}$$

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METHOD II

Using feet (50 in. ÷ 12 in./ft.) as our unit of measure, we get:

intensity(1) = 4 rads
intensity(2) = 'x' rads

distance(1) = 4 1/6 ft.
distance(2) = 2 1/2 ft.

Substituting into the formula, we get:

$$\frac{4\text{ rads}}{\text{'x' rads}} = \frac{(2\ 1/2\text{ ft.})^2}{(4\ 1/6\text{ ft.})^2}$$

$$\frac{4\text{ rads}}{\text{'x' rads}} = \frac{(5/2\text{ ft.})^2}{(25/6\text{ ft.})^2}$$

Removing the square, we get:

$$\frac{4\text{ rads}}{\text{'x' rads}} = \frac{25/4\text{ sq. ft.}}{625/36\text{ sq. ft.}}$$

Simplifying the complex fraction, we get:

$$\frac{4\text{ rads}}{\text{'x' rads}} = \frac{9}{25}$$

Solving for 'x', we get:

$$9x = 100$$
$$x = 11.1\text{ rads}$$

PROBLEM 2 ANSWER KEY

a) The amount of radiation the technologist would receive in one hour would be 200 rads.

b) The amount of radiation received in 30 minutes can be found by using the dose/time ratio. **Remember:** Units of time must be the same.

METHOD I

Using minutes (1 hr. = 60 min.) as our unit of time, we get:

dose(1) = 200 rads time(1) = 60 min.
dose(2) = 'x' rads time(2) = 30 min.

Substituting into the proportion, we get:

$$\frac{200 \text{ rads}}{'x' \text{ rads}} = \frac{60 \text{ minutes}}{30 \text{ minutes}}$$

Solving for 'x', we get:

$$60x = 6000$$
$$x = 100 \text{ rads}$$

METHOD II

Using hours (30 min.÷ 60 min./hr.) as our unit of time, we get:

dose(1) = 200 rads time(1) = 1 hr.
dose(2) = 'x' rads time(2) = 1/2 hr.

Substituting into the formula, we get:

$$\frac{200 \text{ rads}}{'x' \text{ rads}} = \frac{1 \text{ hr.}}{1/2 \text{ hr.}}$$

Clearing out the complex fraction, we get:

$$\frac{200 \text{ rads}}{'x' \text{ rads}} = \frac{2}{1}$$

Solving for 'x', we get:

$$2x = 200$$
$$x = 100 \text{ rads}$$

c) Solving this section of the problem requires the use of the intensity/distance proportion:

$$\frac{\text{intensity}(1)}{\text{intensity}(2)} = \frac{\text{distance}(2)^2}{\text{distance}(1)^2}$$

Since the distances being used are two different units of measure, we must change one in order to solve the problem.

METHOD I

Using inches (2 ft. x 12 in./ft.) as our unit of distance, we get:

intensity(1) = 200 rads   distance(1) = 6 inches
intensity(2) = 'x' rads   distance(2) = 24 inches

Substituting into the proportion, we get:

$$\frac{200 \text{ rads}}{'x' \text{ rads}} = \frac{(24 \text{ in.})^2}{(6 \text{ in.})^2}$$

Removing the square, we get:

$$\frac{200 \text{ rads}}{'x' \text{ rads}} = \frac{576 \text{ sq. in.}}{36 \text{ sq. in.}}$$

Solving for 'x', we get:

$$576x = 7200$$
$$x = 12.5 \text{ rads}$$

METHOD II

Using feet (6 in. ÷ 12 in./ft.) as our unit of distance, we get:

intensity(1) = 200 rads distance(1) = 1/2 ft.
intensity(2) = 'x' rads distance(2) = 2 ft.

Substituting into the formula, we get:

$$\frac{200 \text{ rads}}{'x' \text{ rads}} = \frac{(2 \text{ ft.})^2}{(1/2 \text{ ft.})^2}$$

Removing the square, we get:

$$\frac{200 \text{ rads}}{'x' \text{ rads}} = \frac{4 \text{ sq. ft.}}{1/4 \text{ sq. ft.}}$$

Simplifying the complex fraction, we get:

$$\frac{200 \text{ rads}}{'x' \text{ rads}} = \frac{16}{1}$$

Solving for 'x', we get:

$$16x = 200$$
$$x = 12.5 \text{ rads}$$

d) In order to solve part d, students must use both proportion formulas given in the lesson.

The students must first compute the amount of radiation received at a distance of 3 feet for 1 hour or the amount of radiation received at 6 inches for 30 minutes. Hopefully the student will notice that he found the amount of radiation received at 6 inches for 30 minutes in part b. If the student picks up this information, he will only use the formula that involves intensity and distance. Using this formula the student must first covert to the same unit of measure. Again we can use either feet or inches as our unit of distance.

METHOD I

Using inches (3 ft. x 12 in./ft.) as our unit of distance, we get:

intensity(1) = 100 rads	distance(1) = 6 in.
intensity(2) = 'x' rads	distance(2) = 36 in.

Substituting into the proportion, we get:

$$\frac{100 \text{ rads}}{\text{'x' rads}} = \frac{(36 \text{ in.})^2}{(6 \text{ in.})^2}$$

Removing the square, we get:

$$\frac{100 \text{ rads}}{\text{'x' rads}} = \frac{1296 \text{ sq. in.}}{36 \text{ sq. in.}}$$

Solving for 'x', we get:

$$1296x = 3600$$
$$x = 2.8 \text{ rads}$$

METHOD II

Using feet (6 in. ÷ 12 in./ft.) as our unit of distance, we get:

intensity(1) = 100 rads distance(1) = 1/2 ft.
intensity(2) = 'x' rads distance(2) = 3 ft.

Substituting into the formula, we get:

$$\frac{100 \text{ rads}}{\text{'x' rads}} = \frac{(3 \text{ ft.})^2}{(1/2 \text{ ft.})^2}$$

Removing the square, we get:

$$\frac{100 \text{ rads}}{\text{'x' rads}} = \frac{9 \text{ sq. ft.}}{1/4 \text{ sq. ft.}}$$

Simplifying the complex fraction, we get:

$$\frac{100 \text{ rads}}{\text{'x' rads}} = \frac{36}{1}$$

Solving for 'x', we get:

$$36x = 100$$
$$x = 2.8 \text{ rads}$$

If the student does not pick up on the conversion in part b, the process involves finding the amount of radiation received at 3' for one hour and then finding the amount received at 3' for 30 minutes. The first step would involve using the intensity/distance formula. (The same units of distance must be used in the formula.)

METHOD I

Using inches (3 ft. x 12 in./ft.) as our unit of distance, we get:

intensity(1) = 200 rads	distance(1) = 6 in.
intensity(2) = 'x' rads	distance(2) = 36 in.

Substituting into the proportion, we get:

$$\frac{200 \text{ rads}}{\text{'x' rads}} = \frac{(36 \text{ in.})^2}{(6 \text{ in.})^2}$$

Removing the square, we get:

$$\frac{200 \text{ rads}}{\text{'x' rads}} = \frac{1296 \text{ sq. in.}}{36 \text{ sq. in.}}$$

Solving for 'x', we get:

$$1296x = 7200$$
$$x = 5.6$$

METHOD II

Using feet (6 in. ÷ 12 on./ft.) as our unit of distance, we get:

intensity(1) = 200 rads   distance(1) = 1/2 ft.
intensity(2) = 'x' rads   distance(2) = 3 ft.

Substituting into the proportion, we get:

$$\frac{200 \text{ rads}}{\text{'x' rads}} = \frac{(3 \text{ ft.})^2}{(1/2 \text{ ft.})^2}$$

Removing the square, we get:

$$\frac{200 \text{ rads}}{\text{'x' rads}} = \frac{9 \text{ sq. ft.}}{1/4 \text{ sq. ft.}}$$

Simplifying the complex fraction, we get:

$$\frac{200 \text{ rads}}{\text{'x' rads}} = 36$$

Solving for 'x', we get:

$$36x = 200$$
$$x = 5.6 \text{ rads}$$

We must now use the dose/time proportion to find the number of rads received for 30 minutes at the 3′ distance.

METHOD I

Using minutes (1 hour = 60 minutes) as our unit of time, we get:

dose(1) = 5.6 rads	time(1) = 60 min.
dose(2) = 'x' rads	time(2) = 30 min.

Substituting into the proportion, we get:

$$\frac{5.6 \text{ rads}}{\text{'x' rads}} = \frac{60 \text{ min.}}{30 \text{ min.}}$$

Solving for 'x', we get:

$$60x = 168$$
$$x = 2.8 \text{ rads}$$

METHOD II

Using hours (30 min. ÷ 60 min./ hr.) as our unit of time, we get:

dose(1) = 5.6 rads	time(1) = 1 hr.
dose(2) = 'x' rads	time(2) = 1/2 hr.

Substituting into the proportion, we get:

$$\frac{5.6 \text{ rads}}{\text{'x' rads}} = \frac{1 \text{ hr.}}{1/2 \text{ hr.}}$$

Simplifying the complex fraction, we get:

$$\frac{5.6 \text{ rads}}{\text{'x' rads}} = 2$$

Solving for 'x', we get:

$$2x = 5.6$$
$$x = 2.8 \text{ rads}$$

PROBLEM 3 ANSWER KEY

To solve problem 3, we use the intensity/distance formula.

Before the problem can be solved, make sure the units of distance are the same.

METHOD I

Using inches (6 ft. x 12 in./ft.) as our unit of distance, we get:

intensity(1) = 2.5 rads distance(1) = 72 in.
intensity(2) = 'x' rads distance(2) = 36 in.

Substituting into the proportion, we get:

$$\frac{2.5 \text{ rads}}{\text{'x' rads}} = \frac{(36 \text{ inches})^2}{(72 \text{ inches})^2}$$

Removing the square, we get:

$$\frac{2.5 \text{ rads}}{\text{'x' rads}} = \frac{1296 \text{ sq. in.}}{5184 \text{ sq. in.}}$$

Solving for 'x', we get:

$$1296x = 12960$$
$$x = 10 \text{ rads}$$

METHOD II

Using feet (36 in. ÷ 12 in./ft.) as our unit of distance, we get:

intensity(1) = 2.5 rads distance(1) = 6 ft.
intensity(2) = 'x' rads distance(2) = 3 ft.

Substituting into the proportion, we get:

$$\frac{2.5 \text{ rads}}{\text{'x' rads}} = \frac{(3 \text{ ft.})}{(6 \text{ ft.})}$$

Removing the square, we get:

$$\frac{2.5 \text{ rads}}{\text{'x' rads}} = \frac{9 \text{ sq. ft.}}{36 \text{ sq. ft.}}$$

Solving for 'x', we get:

$$9x = 90$$
$$x = 10 \text{ rads}$$

PROBLEM 4 ANSWER KEY

In order to solve problem 4, a student must recall the maximum permissible dosage is 100 rads/40 hr. week, which results in 2.5 rads/hour. The student will have to compute the number of rads the technologist would receive if he moved to a distance of 3 feet.

The units of distance are the same, therefore, in order to solve the problem, you must substitute into the intensity/distance formula.

The given information is:

intensity(1) = 10 rads	distance(1) = 2 ft.
intensity(2) = 'x' rads	distance(2) = 3 ft.

Substituting into the proportion, we get:

$$\frac{10 \text{ rads}}{\text{'x' rads}} = \frac{(3 \text{ ft.})^2}{(2 \text{ ft.})^2}$$

Removing the square, we get:

$$\frac{10 \text{ rads}}{\text{'x' rads}} = \frac{9 \text{ sq. ft.}}{4 \text{ sq. ft.}}$$

Solving for 'x', we get:

$$9x = 40 \text{ rads}$$
$$x = 4.4 \text{ rads}$$

The technologist does exceed his MPD because he is receiving 4.4 rads per hour which is over the allowable MPD of 2.5 rads/hour.

In the second portion of problem 4, the student is asked to use the same proportion (intensity/distance) but solve for distance.

The given information is:

intensity(1) = 10 rads	distance(1) = 2 ft.
intensity(2) = 2.5 rads	distance(2) = 'x' ft.

Substituting into the proportion, we get:

$$\frac{10 \text{ rads}}{2.5 \text{ rads}} = \frac{(x \text{ ft.})^2}{(2 \text{ ft.})^2}$$

Removing the square, we get:

$$\frac{10 \text{ rads}}{2.5 \text{ rads}} = \frac{x^2 \text{ sq. ft.}}{4 \text{ sq. ft.}}$$

Solving for 'x', we get:

$$\begin{aligned} 2.5x^2 &= 40 \text{ sq. ft.} \\ x^2 &= 16 \text{ sq. ft.} \\ x^2 &= 4 \text{ ft.} \end{aligned}$$

The technologist must stand at a minimum distance of 4 ft. from the source in order not to exceed the MPD.

PROBLEM 5 ANSWER KEY

Problem 5 involves the use of both formulas to compute the amount of radiation being received from a given source. To compute the amount of radiation received standing one foot from the source for 10 minutes, the dose/time formula must be used. Units of time must be the same also.

METHOD I

Using minutes (1 hr. = 60 min.) as our unit of time, we get:

dose(1) = 20 rads   time(1) = 60 min.
dose(2) = 'x' rads   time(2) = 30 min.

Substituting into the proportion, we get:

$$\frac{20\text{ rads}}{\text{'x' rads}} = \frac{60\text{ minutes}}{10\text{ minutes}}$$

Solving for 'x', we get:

$$60x = 200$$
$$x = 3.3\text{ rads}$$

METHOD II

Using hours (10 min. ÷ 60 min./hr.) as our unit of time, we get:

dose(1) = 20 rads   time(1) = 1 hr.
dose(2) = 'x' rads   time(2) = 1/6 hr.

Substituting into the proportion, we get:

$$\frac{20\text{ rads}}{\text{'x' rads}} = \frac{1\text{ hour}}{1/6\text{ hour}}$$

Simplifying the complex fraction, we get:

$$\frac{20\text{ rads}}{\text{'x' rads}} = 6$$

Solving for 'x', we get:

$$6x = 20$$
$$x = 3.3\text{ rads}$$

To find the amount of radiation received for one hour at a distance of 3 feet, we must use the intensity/distance formula. Since both units of distance are the same, there is no need to make any conversions.

The given information is:

intensity(1) = 20 rads	distance(1) = 1 ft.
intensity(2) = 'x' rads	distance(2) = 3 ft.

Substituting into the formula, we get:

$$\frac{20 \text{ rads}}{'x' \text{ rads}} = \frac{(3 \text{ ft.})^2}{(1 \text{ ft.})^2}$$

Removing the square, we get:

$$\frac{20 \text{ rads}}{'x' \text{ rads}} = \frac{9 \text{ sq. ft.}}{1 \text{ sq. ft.}}$$

Solving for 'x', we get:

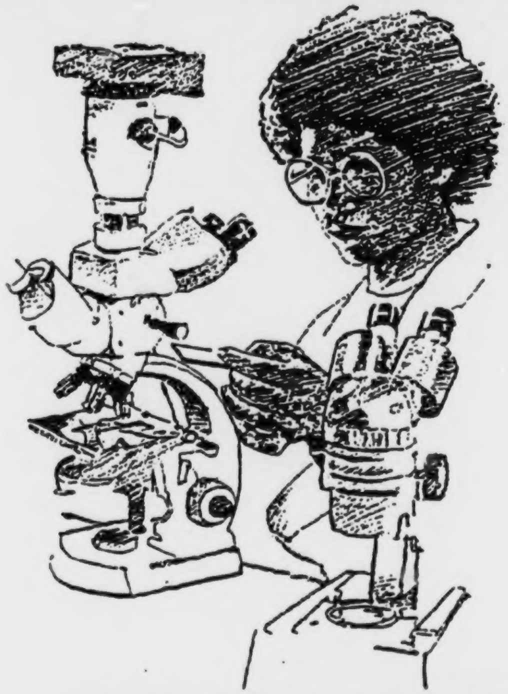
$$9x = 20$$
$$x = 2.2 \text{ rads}$$

The safer of the options is standing at a distance of 3 feet for a time period of one hour.

GLOSSARY

Allied Health Fields	Those medical areas such as Radiologic Technology, Medical Laboratory Technology, Nursing, or Surgical Technology which provide support services for physicians.
Diverge	To expand from a common point.
Exposure	The condition of being subjected to a certain amount of radiation.
Mid-Level Technology Careers	Those careers which require post-secondary educational training, but not necessarily four years of study.
Nuclear Medicine	The branch of medicine concerned with the identification, treatment, and investigation of disease through the use of radioactive elements.

MATHEMATICS FOR THE WORKPLACE



APPLICATIONS FROM MEDICAL LABORATORY TECHNOLOGY

A TEACHER'S GUIDE

Developed by:

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INTRODUCTION

This module is designed as an additional resource for teaching fractions and decimals and their applications to "real-world" situations. The applications in this module are from the allied health field of medical laboratory technology.

Teachers who use this module should be aware of its applicability to several areas of mathematics. This module can be used as part of the regular instruction for such courses as General Math, Technical/Applied Math, or Algebra I.

An additional suggestion of how to use this module is to invite, when possible, a medical laboratory technician to speak to the class with which this module is to be used. This module can then be implemented as a follow-up activity over the next several days, giving students an opportunity to work problems associated with a medical laboratory technician's job responsibilities.

However, keep in mind these are only suggestions. Each teacher and/or district will have to decide where the module best fits into the overall structure of the curriculum.

RATIONALE FOR THE UNIT

Many times students have difficulty relating concepts and theories presented in the classroom to real-life situations. This problem may occur when information is presented in an isolated setting. Students, who are unable to see a connection between what is taught and the real-world applications, often become disinterested in the subject. This can result in a lack of motivation on the part of the student. Consequently, the student perceives no need to apply himself to his studies and, therefore, he does not take courses which challenge him as a learner.

This module is designed to provide a real-world context where fractions and decimals are used as part of a daily routine. Providing examples from real-life settings helps students better understand the need to study and to learn the mathematical concepts taught on a daily basis. Real-life applications can provide the needed relevance to motivate students, not only to apply themselves to their studies but also to take the highest level of mathematics they are capable of handling successfully.

HOW TO USE THIS MODULE

The table of contents in this packet gives a listing of the concepts encompassed within the module. This is a teacher' guide, not a packet of material to be duplicated and presented to students. Much of the material within the packet is for the teacher's use only. There are, however, several sections which meed to be duplicated and presented to the students in order to have them complete the tasks.

Pages 3-4 give the students an introduction to the allied health field of medical laboratory technology. Included in this introduction is such information as the technicians, duties, where technicians work, and how to prepare for the field in high school. **These pages can be duplicated and given to the students as introductory information.**

Page 5 gives an explanation of the task and the need for the task. **This page can also be duplicated and given to the students as information.**

Pages 6-8 explain the specific tasks being presented in the module. If the teacher so desires, she may duplicate these pages and give them to the students. However, please bear in mind this is only a suggestion. If the teacher feels students do not need this information and that it can be best presented through lecture, then the teacher need not duplicate these pages.

Pages 9-12 are sample problems involving a white blood cell count and a red blood cell count. Again, if the teacher so desires, these pages may be duplicated and given to the students.

Page 13 gives related word problems for further practice of the skills presented. **This page can also be duplicated and given to the students.**

Pages 14-18 are the answer keys to the Related Problems. The answer keys give the solutions to each part of the related problems. Also, questions 5 - 7 are "thought" questions which require more than computations. Some possible answers are listed for each questions.

The Related Diagrams, pages 20-23, can be used as either overhead transparencies or can be duplicated and given to students as information.

EXAMINING THE PROFESSION

Description of Career

"A medical laboratory technician performs general tests in all laboratory areas."[1] Working under direct supervision of a medical technologist, a medical laboratory technician searches for clues in specimen samples for the absence, presence, extent, and causes of diseases.[2]

"Medical laboratory technicians (MLTs) must be accurate, dedicated, and skilled."[3] MLTs receive training through 2-year colleges or hospital programs and must pass a national examination to become certified. They must also be self-motivated, to take initiative to do what must be done every day--to pitch in as an important member of the health care team.[4]

Technicians should like:

- activities dealing with things and objects;
- using set methods and procedures;
- activities of a scientific and technical mature.

A technician should be able to:

- perform a variety of duties that may often change;
- attain established standards of accuracy;
- understand mathematical concepts.

Job Related Duties

"The medical laboratory technician performs routine laboratory tests in:

- blood-banking
- hematology
- microbiology
- chemistry
- immunology
- urinalysis."[5]

Other duties may include:

- collecting specimens for chemical analysis;
- setting up and maintaining laboratory equipment;
- analyzing samples for chemical content or reaction.

Working Conditions

Most technicians work in hospitals. Others may work in private laboratories, doctors' offices, clinics, public health agencies, pharmaceutical firms, research institutions, university laboratories, or industrial plants.

Technicians generally work a 40-hour week. Evening, weekend, and holiday work may be required for those employed by hospitals. Occasionally technicians are hired specifically for on-call, part-time, evening, or weekend assignments.

High School Preparation

In order to be best prepared to enter a program of studies in medical laboratory technology a student should take courses in algebra, biology, and chemistry.

Students may receive additional information on MLT careers or other mid-level allied health careers from their high school counselor or from area technical colleges.

Students may also consider becoming a volunteer at the local hospital to gain exposure to the various allied health careers.

SPECIFIC JOB RELATED TASK

Introduction to the Task

One specific task a medical laboratory technician performs is determining the red or white cell count in a blood sample. Cell counts above or below the normal range may indicate the presence of some type of infection. When a patient visits the doctor, one way of determining if there is an infection is to perform a white blood count (WBC) or red blood count (RBC).

The normal white blood count is usually between 5,000 and 10,000 cells per cubic millimeter.

The normal red blood cell count is between 4,000,000 and 6,000,000 cells per cubic millimeter.

Need for the Task

High white blood cell counts may indicate:
- appendicitis
- pneumonia
- meningitis
- other diseases.
- leukemia
- tonsillitis
- chicken pox

Low white blood cell counts may indicate:
- measles
- typhoid fever
- other diseases.
- influenza
- infectious hepatitis

Low red blood cell counts may indicate:
- undetected internal bleeding;
- severe anemia;
- bone marrow malfunctions.

High red blood cell counts may:
- cause high blood pressure;
- indicate bone marrow malfunctions.

It is extremely important for a MLT to be accurate because a miscalculation might result in:
- a wrong type of medication being issued to the patient;
- a disease going undetected;
- additional and unnecessary suffering for the patient.

Dilution

In order to calculate the WBC or RBC, a MLT must proceed through several steps. Once the blood has been drawn and place in the pipette, it is then diluted. Dilution ratio indicates the relative amount of substances in a solution.

Dilution is the ratio of the number of parts being diluted in a solution to the total number of parts in the solution. In RBC dilution, the ratio is the number of milliliters (ml) pulled up in the RBC pipette to 10 ml.

Example:

> If 1 ml of blood was drawn and the pipette was filled with solution to the 10 ml mark, the dilution ratio would be 1/10.

In a WBC dilution, the ratio is the number of ml pulled up in the pipette to 100 ml.

Example:

> If 1 ml of blood was drawn and the pipette was filled with solution to the 100 ml mark, the dilution ratio would be 1/100.

Dilution Factor

Since whole blood is not used in the counting process, a dilution factor is needed. In order to determine the dilution factor, the technician must be able to determine the dilution ratio.

The dilution factor is the reciprocal of the dilution ratio.

Example:

> If the dilution ratio is 1/10, then the dilution factor is 10.

Since the dilution ratio gives the ratio of blood to the whole solution, you must take the reciprocal of the dilution ratio in order to correct for diluting the solution.

Depth Factor

The entire counting process revolves around the fact that the technician is trying to determine the number of red or white blood cells in one cubic millimeter of blood. This would mean a cube one millimeter in length on all sides. The blood sample is placed in a chamber one millimeter in length by one millimeter in width but very seldom is the chamber one millimeter in depth.

The most common depth of the chamber is 0.1 mm. In order to compensate for this depth of less than one millimeter, a depth factor must be calculated. The depth factor is the reciprocal of the depth of the chamber being used in the counting process.

Example:

> If the depth of the chamber is .1 mm then the reciprocal of that depth is 1/.1 or 10. If the depth of the chamber is .2 mm then the reciprocal of that depth is 1/.2 or 5. Taking the reciprocal of the depth of the chamber is the same a converting the chamber to a depth of one millimeter.

If no information is given concerning the depth of the chamber, assume a standard counting chamber with a depth of .1 mm.

Area Counted

For a RBC, the area counted is the ratio of the number of squares counted to the total number of squares (25).

Example:

> If during the RBC process only 10 of the 25 squares were counted the area counted would be 10/25 or .4 square mm.

For a WBC, the area counted would be the actual number of 1-millimeter squares counted.

Area Factor

The area factor, which relates to the total number of squares counted on the hemocytometer, is the reciprocal of the area counted.

Example:

> If 2 white cell squares were counted the area factor would be 1/2 or .5 square mm. If 10 red cell squares were counted the area factor would be 1/.4 or 2.5 square mm.

Volume Factor

The volume factor for the RBC or WBC is the area factor times the depth factor. This volume factor is equivalent to having a cubic millimeter of blood in the sample.

Total Cell Count

In order to determine the RBC or WBC, the technician must multiply the number of cells counted by the depth factor. This product must then be multiplied by the dilution factor. This second product must then be divided by the area counted. This gives the number of cells per cubic millimeter of blood in the body. It is this final number that the technician reports to the doctor in order for the doctor to make a diagnosis.

TOTAL CELL COUNT:

$$\frac{\text{NUMBER OF CELLS COUNTED} \times \text{DEPTH FACTOR} \times \text{DILUTION FACTOR}}{\text{AREA COUNTED}}$$

SAMPLE PROBLEM A: CALCULATING A WHITE BLOOD CELL COUNT

In a test to determine the number of white blood cells in a sample of blood, blood was drawn to the 0.5 ml level in a WBC pipette. 4 white squares were counted on the hemocytometer and 104 cells were found in the count. The depth of the hemocytometer chamber is 0.1 mm.

FIND: (a) dilution, (b) dilution factor, (c) depth factor, (d) area counted, (e) area factor, (f) volume factor, and (g) the number of cells/cubic mm.

STEP 1: Determining the Dilution Ratio

$$\frac{\text{The number of ml pulled up in the WBC or RBC pipette}}{\text{(10 for WBC pipette or 100 for RBC pipette)}}$$

The amount of blood pulled into the pipette is .5 ml. Therefore the dilution is:

$$\frac{0.5}{10} \quad \text{or} \quad \frac{1}{20}$$

STEP 2: Determining the Dilution Factor

The dilution factor is the reciprocal of the dilution ratio. The dilution ratio is:

$$\frac{1}{20}$$

The reciprocal is:

$$\frac{1}{\frac{1}{20}}$$

or 20.

STEP 3: Calculating the Depth Factor

The depth factor is the reciprocal of the depth of the chamber. The depth of the chamber is .1 ml. The reciprocal of .1 is:

$$\frac{1}{.1}$$

which simplifies to 10.

STEP 4: Determining the Area Counted

The blood was drawn in a WBC pipette, therefore, the area counted is 4 square millimeters.

STEP 5: Calculating the Area Factor

The area factor in a WBC is the reciprocal of the area counted. The area counted was 4 square millimeter, therefore the area factor for this sample is:

$$\frac{1}{4}$$

STEP 6: Calculating the Volume Factor

The volume factor is the area factor times the depth factor.

Area factor = $\frac{1}{4}$ Depth Factor = 10

$$\frac{1}{4} \text{ X } 10 = \frac{10}{4} = 2.5 \text{ cubic milliliters}$$

STEP 7: Calculating the Final Cell Count

The cells per cubic millimeter is the number WBC counted times the dilution factor times the depth factor divided by the area counted.

WBC counted = 104	dilution factor = 20
depth factor = 10	area counted = 4

$$\frac{104 \times 20 \times 10}{4} = 5{,}200$$

Therefore the WBC count is 5,200 cells/cubic millimeter.

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SAMPLE PROBLEM B: CALCULATING A RED BLOOD CELL COUNT

In a RBC pipette the blood is drawn to the 0.5 ml level. Five red squares are counted. A counting chamber depth of 0.1 mm was used. 500 cells were counted.

FIND: (a) dilution, (b) dilution factor, (c) depth factor, (d) area counted, (e) area factor, (f) volume factor, and (g) cells counted/cubic mm.

(**NOTE:** The major difference between determining the red blood cell count and the white blood cell count is the denominator used in the dilution rate. The calculation steps are basically the same in both processes.)

STEP 1: Determining the Dilution Ratio

$$\frac{\text{The number of ml pulled up in pipette}}{\text{100 for RBC pipette}}$$

Since .5 ml of blood was drawn into the pipette, the dilution ratio is:

$$\frac{.5}{100} \quad \text{or} \quad \frac{1}{200}$$

STEP 2: Determining the Dilution Factor

The dilution factor is the reciprocal of the dilution ratio. The dilution ratio is:

$$\frac{1}{200}$$

The reciprocal of the dilution ratio is:

$$\frac{1}{\frac{1}{200}}$$

or 200.

STEP 3: Calculating the Depth Factor

The depth factor is the reciprocal of the chamber depth. The depth of the chamber is .1 ml.

The reciprocal of .1 is:

$$\frac{1}{.1}$$

or 10.

STEP 4: Determining the Area Counted

Since we are making a RBC count, the area counted is the number of squares counted divided by the number of squares that could have been counted.

The number of squares counted = 5.
The number of squares that could have been counted = 25.

The area counted is:

$$\frac{5}{25} \text{ or } \frac{1}{5}$$

STEP 5: Calculating the Area Factor

The area factor is is the reciprocal of the area counted.

Area counted was

$$\frac{1}{5}$$

The reciprocal is

$$\frac{1}{\frac{1}{5}}$$

or 5.

STEP 6: Calculating the Volume Factor

The volume factor is the area factor times the depth factor.

Area factor = 5　　　Depth factor = 5

5 x 5 = 25 cubic milliliters

STEP 7: Calculating the Final Cell Count

The cells/cubic mm is the number of cells counted times the dilution factor times the depth factor divided by the area counted.

cells counted = 500
depth factor = 10
dilution factor = 200
area counted = $\frac{1}{5}$

$$\frac{500 \times 200 \times 10}{\frac{1}{5}} = 5,000,000$$

Therefore the RBC is 5,000,000 cells/cubic millimeter.

RELATED PROBLEMS

For each of the following four problems

FIND: (a) dilution, (b) dilution factor, (c) depth factor, (d) area counted , (e) area factor, (f) volume factor, and (g) cells/cubic mm.

1) WBC pipette
   blood drawn to 0.5 ml mark
   5 white square counted
   456 cells found

2) RBC pipette
   blood drawn to 0.5 ml mark
   6 red squares counted
   1050 cells found

3) WBC pipette
   blood drawn to 0.8 ml mark
   4 white squares counted
   100 cells found

4) RBC pipette
   blood drawn to 0.2 ml mark
   chamber depth 0.2 mm
   10 red squares counted
   175 cells counted

5) Based on the final cell count of each of the above problems what might be the next step taken by the doctor in order to determine exactly what is wrong with the patient?

6) White blood cells are used to fight infections in the body. Why would a low white blood cell count indicate the presence of an infection in the body?

7) A MLT reported to his/her supervisor that the WBC for a certain patient was 160,000 cells/cubic mm. The supervisor asked the technician the level to which the blood was drawn and the number of cells counted. Blood was drawn to the 0.5 mark and 320 cells were counted. The supervisor then asked another technician to run a test. You are to assume the role of the second technician. What cell count did the second technician find? Does this agree with the first count? If the first count was inaccurate where did the first technician make his/her mistake? What consequences could have occurred due to the incorrect count being reported to the doctor?

PROBLEM 1 ANSWER KEY

a) Dilution Ratio: $\frac{.5}{10} = \frac{1}{20}$

b) Dilution Factor: The dilution factor is the reciprocal of the dilution ratio or:

$$\frac{1}{\frac{1}{20}} = 20$$

c) Depth Factor: Since no information was given concerning the counting chamber depth, assume a standard counting chamber depth of 0.1 mm. The depth factor is the reciprocal of the chamber depth.

$$\frac{1}{0.1} \quad \text{or} \quad 10.$$

d) Area Counted: This is a WBC pipette, therefore the area counted is the same as the number of squares counted or 5.

e) Area Factor: The area factor is the reciprocal of the area counted or

$$\frac{1}{5}$$

f) Volume Factor: The volume factor is the area factor times the depth factor.

$$\frac{1}{5} \times 2 = \frac{2}{5}$$

g) Cells/cubic mm: The cells per cubic millimeter is the number of cells counted times the dilution factor times the depth factor divided by the area counted.

$$\frac{456 \times 20 \times 10}{5} = 18{,}240 \text{ cell/cubic mm}$$

PROBLEM 2 ANSWER KEY

a) Dilution Ratio: $\frac{.5}{100} = \frac{1}{200}$

b) Dilution Factor: The dilution factor is the reciprocal of the dilution ratio or:

$$\frac{1}{\frac{1}{200}} = 200$$

c) Depth Factor: Since no information was given concerning the counting chamber depth, assume a standard counting chamber with a depth of 0.1 mm. The depth factor would be:

$$\frac{1}{0.1} \text{ or } 10.$$

d) Area Counted: Since this is a RBC count the area counted is the number of red squares counted (6) divided by the total number of red squares (25). Area counted equals

$$\frac{6}{25}$$

e) Area Factor: The area factor is the reciprocal of the area counted. This would be:

$$\frac{1}{\frac{6}{25}} \text{ or } \frac{25}{6}$$

f) Volume Factor: The volume factor is the area factor times the depth factor.

$$10 \times \frac{25}{6} = \frac{125}{3}$$

g) Cells/cubic mm: The cells per cubic millimeter is the number of cells counted times the dilution factor times the depth factor divided by the area counted.

$$\frac{1050 \times 200 \times 10}{\frac{6}{25}} = 8{,}750{,}000 \text{ cells/cubic mm}$$

PROBLEM 3 ANSWER KEY

a) Dilution Ratio: $\frac{.8}{10} = \frac{2}{25}$

b) Dilution Factor: The dilution factor is the reciprocal of the dilution ratio or:

$$\frac{1}{\frac{2}{25}} = \frac{25}{2} = 12.5$$

c) Depth Factor: Since no information was given concerning the counting chamber depth, assume a standard counting chamber with a depth of 0.1 mm. The depth factor is: 1/0.1 or 10

d) Area Counted: Since this is a WBC count, the area counted is the same as the number of squares counted or 4 squares.

e) Area Factor: The area factor is the reciporcal of the area counted or

$$\frac{1}{4}$$

f) Volume Factor: The volume factor is the area factor times depth factor.

$$\frac{1}{4} \times 10 \text{ or } 2.5$$

g) Cells/cubic mm: The cells per cubic millimeter is the number of cells counted times the dilution factor times the depth factor divided by the area counted.

$$\frac{100 \times 10 \times 12.5}{4} = 3{,}125 \text{ cells/cubic mm}$$

PROBLEM 4 ANSWER KEY

a) Dilution Ratio: $\frac{.2}{100} = \frac{1}{500}$

b) Dilution Factor: The dilution factor is the reciprocal of the dilution ratio or:

$$\frac{1}{\frac{1}{500}} \text{ or } 500.$$

c) Depth Factor: The depth of the counting chamber is 0.2 mm. The depth factor is the reciprocal of the depth of the counting chamber or:

$$\frac{1}{.2} = 5.$$

d) Area Counted: The area counted is the number of squares counted (10) divided by the total number of red squares (25). Area counted equals:

$$\frac{10}{25} = \frac{2}{5}$$

e) Area Factor: The area factor is the reciprocal of the area counted or:

$$\frac{1}{\frac{2}{5}} = \underline{5}$$

f) Volume Factor: The volume factor is the area factor times the depth factor.

$$\frac{5}{2} \times 5 = \frac{25}{2}$$

g) Cells/cubic mm: The cells per cubic millimeter is the number of cells counted times the dilution factor times the depth factor divided by the area counted.

$$\frac{175 \times 5 \times 500}{\frac{2}{5}} = 1{,}093{,}750 \text{ cells/cubic mm}$$

PROBLEM 5 ANSWER KEY

The answers will vary. However, the intent of this question is to get the students to think about possible steps the doctor might take after receiving the blood cell count. Possible answers may include requiring additional blood tests to narrow the number of possible illnesses, admitting the patient to the hospital for further tests, or prescribing some type of medication.

PROBLEM 6 ANSWER KEY

White blood cells fight infection. A low white blood cell count may indicate the presence of an infection that is being caused by a virus rather than a bacteria. The treatment for getting rid of a virus would not include the use of antibiotics. The virus that is present in the body is reducing the number of white cells in the blood that can be counted in a WBC.

PROBLEM 7 ANSWER KEY

The correct cell count is 16,000. The dilution is 1/20. The dilution factor is 20. The depth factor is 10. The area counted is 4 squares. The final cell count is

$$\frac{20 \times 10 \times 320}{4} = 16{,}000 \text{ cells/cubic mm}$$

The first technician used the wrong dilution ratio. A dilution ratio of 1/200 was used instead of 1/20. This gave an incorrect dilution factor of 200. Hopefully the students will pick up on the fact that 160,000 is 10 times 16,000. This will enable them to see rather quickly where the mistake was made.

Consequences of the incorrect count being reported could include the doctor prescribing a wrong medication, an improper diagnosis of the problem, the patient having to be put through additional, yet unnecessary, testing, etc.

GLOSSARY[6]

Anemia	A deficiency in the number of red blood cells in the body.
Antibody	Any of various proteins in the body that produce immunity against certain microorganisms and their poisons.
Antigen	A substance that stimulates antibody production.
Blood Banking	Drawing blood from a donor, separating blood into its components, identifying and matching of components to insure safe transfusion.
Chemistry	The analysis of the chemical composition of blood and body fluids.
Hematology	The laboratory area that counts, describes and identifies cells in blood and other body fluids. The information is used to detect anemias and leukemia among other diseases.
Immunology	The study of biological defenses against viruses or allergy-causing agents which most often cause antigen-antibody reactions.
Meningitis	Swelling of any or all parts of the brain and/or spinal cord caused by bacteria.
Microbiology	A branch of biology concerned with microorganisms such as bacteria and fungi.
Urinalysis	The chemical analysis of urine.

REFERENCES

American Society of Clinical Pathologists, Careers in Medical Laboratory Technology; Chicago: ASCP Board of Regents, 1989, pg. 3

Ibid., pg. 3

Ibid., pg. 3

Ibid., pg. 3

American Society of Clinical Pathologists, Preparing for a Career in the Medical Laboratory; Chicago: ASCP Board of Regents, 1989

Note: The definitions for blood banking, chemistry, hematology, immunology, and microbiology are from the publication Careers in Medical Laboratory Technology published by the American Society of Clinical Pathologists, Chicago, IL

FIGURE MLT-1

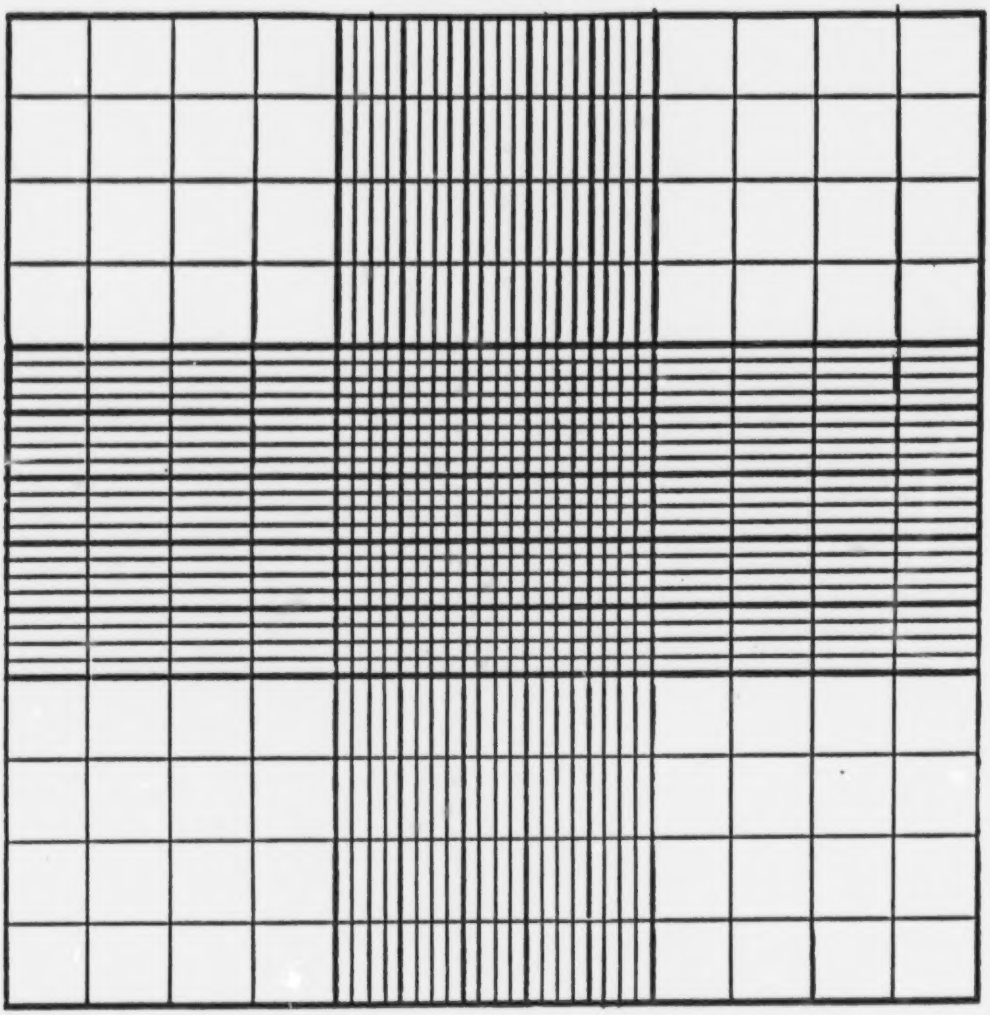

Figure MLT-1 illustrates the Improved Neubauer Hemocytometer, which is the most common type used to calculate WBC or RBC. This is an enlargement of the actual diagram the technician uses in counting the number of cells. The total area of the diagram is 9 square millimeters.

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FIGURE MLT-2

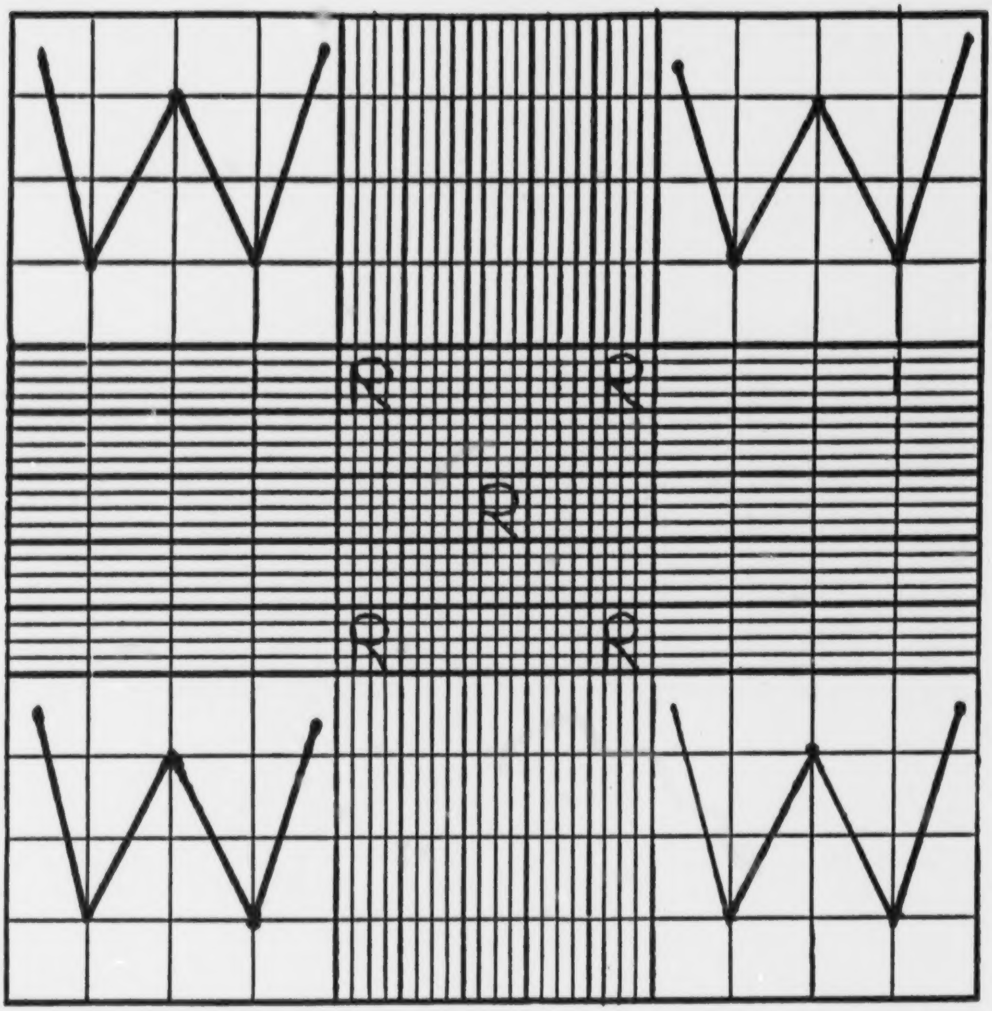


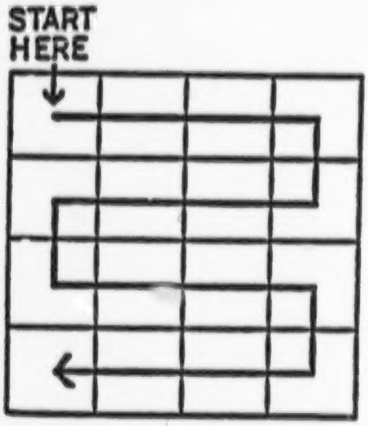
Figure MLT-2 shows which areas are used for the WBC or the RBC. The four large corner squares are referred to as white squares because they are used for the WBC. (Note: These squares are marked with a large "W". The "W" does not appear on the hemocytometer slide. It is only placed on this diagram for illustration.)

The central square is subdivided into 25 squares, often referred to as red squares, because they are used for the RBC. The four smaller, corner squares and the smaller, center square are used to performing the RBC. (Note: These squares are marked with a "R". The "R", like the "W" for the white squares, does not appear on the hemocytometer slide. They are only on this chart for illustration.)

FIGURE MLT-3

WBC Counting Area

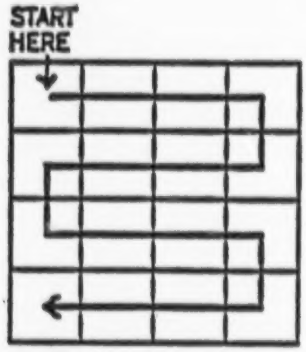
The areas counted in a WBC count are the four (one square millimeter) corners. These squares have the letter "W" in them. There are 1 squares in the one square millimeter. So the total number of squares counted would be 16 x 4 = 64. Each one square millimeter is counted by starting in the upper left hand corner.



Start in the upper left hand corner. Follow path of arrow.

RBC Counting Area

The areas counted in a RBC count are located in the central one square millimeter. The four corners and the central small squares are counted. These squares have the letter "R" in them. There are 16 small squares in one of the "R" areas. So the total squares counted would be 16 x 5 = 90. Each square is counted by starting in the upper left hand corner.



Start in the upper left hand corner. Follow path of arrow.

FIGURE MLT-4

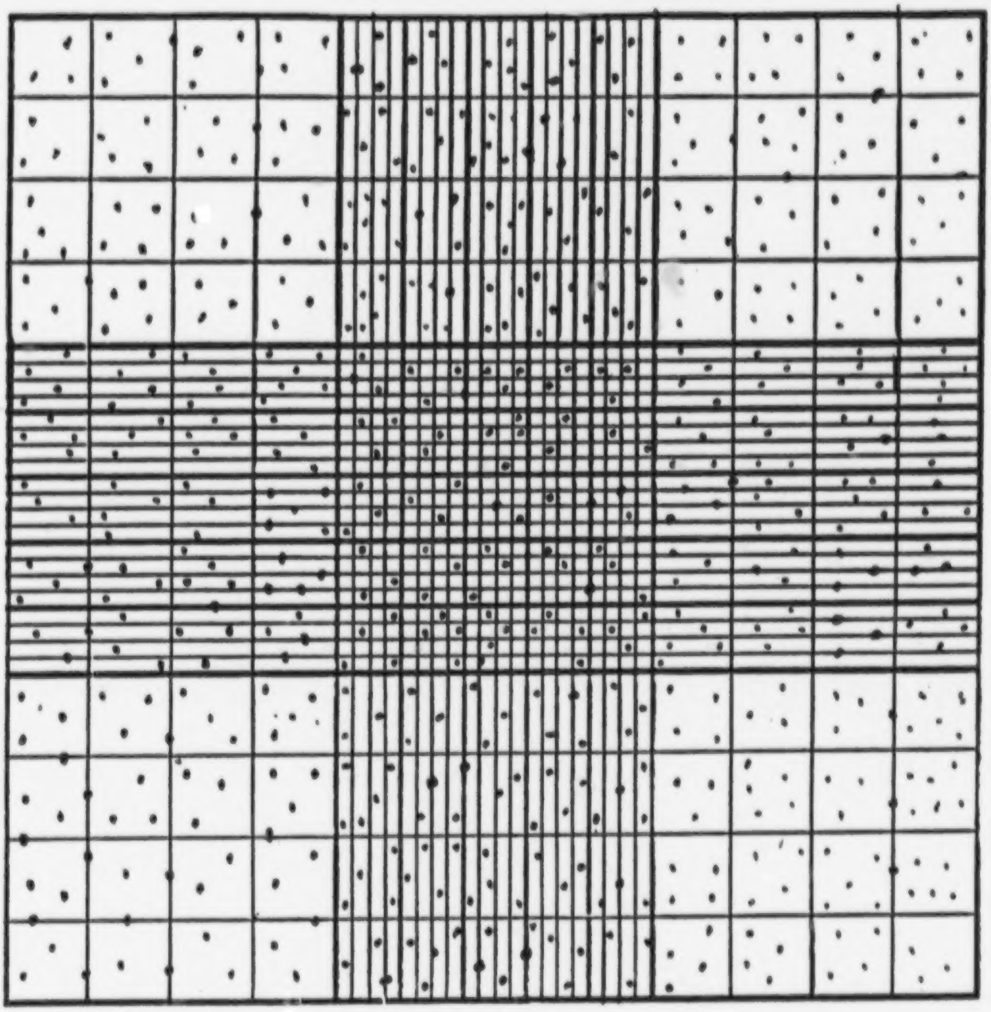


Figure MLT-4 is an illustration of what a technician would see when he looks at the specimen slide on the hemocytometer. The black dots illustrate the blood cells that are used in the counting process.

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TECHNICAL MATHEMATICS

COURSE DESCRIPTION

Technical Mathematics is a full year course for students who have successfully completed Geometry and Algebra II. This course will be an Algebra III /Trigonometry class with technical applications designed to ensure that students have the prerequisite skills needed for success in the technology courses offered at the college level.

This course is part of a pilot program in the 2+2 Tech-Prep/Associate-Degree Program with Tri-County Technical College. When fully implemented in the fall of 1989, this course will be designed for students who are considering postsecondary education leading to the associate degree in an technical area such as Electronics Engineering, Graphics Engineering, Automated Manufacturing Technology or Quality Assurance. I hope that this course will encourage more students to focus on an educational goal and develop their potential for productive work.

PARENTAL ENVOLVEMENT

Parents should be aware of the nature and requirememts of this course. They should also be aware that students must do a considerable amount of homework in order to succeed in this course. I assign homework every day.

TEXTS

Merrill's Advanced Mathematical Concepts
Benjamin/Cummings' Problem Supplement for Technical Mathematics

MATERIALS

Texas Instruments scientific calculator (model TI-34)
Metric/English ruler
protractor
compass
graph paper (about 1/4" grid)
Geometer (optional)

GENERAL COURSE GOALS

The Technical Math student needs to be proficient in the manipulative algebraic and trigonometric skills as well as the application of these skills to various technological fields. This course encompasses and extends topics and concepts of intermediate algebra. It uses geometric concepts extensively and integrates them with algebraic concepts. The scientific calculator is heavily used and the student will be instructed to use it intelligently and effectively.

The broad categories of these ideas and techniques are as follows:

1. Linear Relations and Functions
2. Theory of Equations
3. Matrices and Vectors
4. The Circular Functions
5. The Trigonometric Functions
6. Graphs and Inverses of the Trigonometric Functions
7. Applications of Trigonometry
8. Sequences and Series
9. Polar Coordinates and Complex Numbers
10. Exponential and Logarithmic Functions
11. The Straight Line
12. Conics
13. Probability
14. Descriptive Statistics

INSTRUCTION METHOD

This course is taught in a traditional lecture/problem session format according to the syllabus. In addition, there will be several speakers that will come to talk to the class. The speakers will be department heads from Tri-County Technical College and people in high-tech jobs from area industries. I also hope to be able to arrange a field trip to Tri-County Tech to visit each of the technology labs.

Approximately two (2) days will be spent on each objective. Additional help is available from the instructor during either lunch period and after school on Thursday and Friday.

EVALUATION

Evaluation of student progress is made through an assessment of students' major tests, daily work, notebook and the 9-weeks test.

Major Tests	60%
Daily work	20%
9-wks Test	20%

AFTER THE FIRST FAILURE ON A MAJOR TEST, A PARENT CONFERENCE WILL BE REQUIRED TO DISCUSS MATH PLACEMENT.

Daily work includes classwork and short quizzes that must be completed in class and given only after the homework for that day has been discussed. It covers 1 or 2 lessons and may be either open or closed book/notes (at the teacher's discretion). There will also be some take-home quizzes that must be turned in the following day. A take-home quiz will count no more than 50% of an in-class quiz. A notebook including class notes and all assigned work is required of each student. A bonus (10 points maximum) will be added to the daily average for a complete notebook.

There will be at least four major tests given each quarter. A bonus of two (2) points will be added if a test is corrected, signed and returned the following day. On any major test a student scoring below 70% will be allowed to take one retest. The two grades will then be averaged with a maximum average of 70% being allowed. The retest must be taken after school on the Wednesday following the original test.

I will send home interim reports 2 or 3 times during the 9-weeks. They are to be signed by both parents, if possible, and returned the following day.

WESTSIDE ABSENCE/TARDY POLICY

Regular attendance and completion of all assigned work is expected and necessary for a student to successfully complete this course and receive credit. A student must be present for 170 days in order to be considered for a unit's credit. A student having absences in excess of ten (10) days, regardless of the reason, may not receive credit for the course.

If a student misses a test because of an absence he/she will take the the retest as his/her test and will not be given a retest. It is the student's responsibility afer an absence to check my weekly assignment sheet and make up all work missed. No credit will be given for make-up work after an unexcused absence.

A student who is not in his/her assigned seat when the tardy bell rings is considered tardy and will be given the appropriate disciplinary punishment. Any student arriving at school between 8:15 - 8:25 is tardy and should report directly to their first period class.

1st tardy - 15 minutes after school
2nd tardy - 30 minutes after school
3rd tardy - student will be referred to assistant principal.

If a student is more than two minutes tardy, he/she is condidered late and must have a legitimate pass from a teacher or the assistant principal. The tardy policy begins anew each 9-weeks.

CLASS RULES

As a student of Westside High School, it is a student's responsibility to take advantage of the education offered here. The entire class period will be used in some learning activity. I will not tolerate a student keeping another from learning or me from teaching.

If disciplinary action should be needed, a student will be assigned extra work after school. One day's notice will be given in order to arrange transportation. Failure to report for after school detention or repeated offences will result in referral to the office.

Conferences may be set up by calling Mr. Burns at 260 - 5230.

Student's signature____

Parent's signature____

TECHNICAL MATHEMATICS

OBJECTIVES

Upon completion of this course, the student should be able to:

CHAPTER 1 - LINEAR RELATIONS and FUNCTIONS

1. Determine whether a relation is a function and find range & domain
2. Write and graph the standard form of a linear equation
3. Find the distance between two points & the slope of a line
4. Write equations of lines using point-slope & slope intercept form
5. Graph linear inequalities and systems of linear inequalities
6. Find the maximum or minimum of a function defined for a polygon
7. Solve problems by using linear programing

CHAPTER 2 - THEORY OF EQUATIONS

1. Find roots of simple polynomial equations
2. Solve quadratics by completing the square or the quadratic equation
3. Use synthetic division to divide polynomials
4. Use the Remainder and Factor theorems to solve polynomial equations
5. Use the Fundamental Theorem of Algebra to solve polynomial equations
6. Use the Rational Root Theorem to identify possible roots of polynomials
7. Use Descartes' Rule and the Upper Bound Theorem to locate zeros of the Upper Bound Theorem

CHAPTER 3 - MATRICES and VECTORS

1. Use determinants and Cramer's Rule to solve systems of equations
2. Add and subtract matrices
3. Multiply matrices
4. Find inverses of matrices and solve matrix equations
5. Use augmented matrices to slove systems of equations
6. Add and subtract vectors geometrically; meas. magnitude & amplitude
7. Add, subtract and multiply vectors algebraically
8. Add, subtract, multiply & find the magnitude of 3-dimensional vectors

CHAPTER 4 - THE CIRCULAR FUNCTIONS

1. Find the coordinates of points determined by the wrapping function

2. Evaluate the circular functions for selected points

3. Evaluate the 6 circular (trig) functions using tables & a scientific calculator

4. Graph the circular (trig) functions from -2π to 2π

5. Use the addition formulas for the sine and cosine functions

6. Use the double and half-number formulas for sine and cosine

CHAPTER 5 - THE TRIGONOMETRIC FUNCTIONS

1. Evaluate the trigonometric functions of angles of right triangles

2. Use interpolation with trigonometric tables

3. Use cofunction, reciprocal, quotient, Pythagorean identities

4. Verify trigonometric identities

5. Use the degree/radian proportion and find length of an arc

6. Use reference angles to evaluate trigonometric functions of angles

7. Evaluate the 6 functions of quadrantal angles by x-y-r ratios

8. Use the sum and difference identities for sine, cosine and tangent

9. Use the double- and half-angle identities for sine,cosine & tangent

CHAPTER 6 - GRAPHS and INVERSES of the TRIGONOMETRIC FUNCTIONS

1. Graph the six trigonometric functions

2. Find the amplitude, period and phase shift of functions

3. Graph functions of the form $y = A \sin k (\theta + c)$

4. Graph compound functions

5. Evaluate inverse trigonometric functions

6. Find principal values of inverse trigonometric functions

7. Write and graph the inverse of a function

CHAPTER 7 - APPLICATIONS OF TRIGONOMETRY

1. Solve trigonometric equations
2. Solve right triangles involving practical applications
3. Use the Law of Sines to solve oblique triangles
4. Use the Law of Cosines to solve oblique triangles
5. Find the area of a triangle from various given information
6. Solve problems using vector triangles

CHAPTER 8 - SEQUENCES and SERIES

1. Recognize arithmetic series and sequences
   Find the nth term, arithmetic mean and sum of n terms of a series
2. Recognize geometric sequences and series
   Find the nth term, arithmetic mean and sum of n terms of a series
3. Find the limit of the terms of an infinite sequence if possible
4. Find the sum of an infinite geometric series
5. Use the binomial theorem to expand binomials; use factorial notation

CHAPTER 9 - POLAR COORDINATES and COMPLEX NUMBERS

1. Graph polar coordinates and simple polar equations
2. Graph the Rose, Limacon, Lemiscate, Cartoid & Spiral of Archimedes
3. Convert between polar and rectangular coordinates
4. Add, subtract, multiply and divide complex numbers algebraically
5. Convert complex numbers between polar and rectangular coordinates
6. Find products and quotients of complex numbers in polar form
7. Use complex numbers in phasor (electrical) applications

CHAPTER 10 - EXPONENTIAL and LOGARITHMIC FUNCTIONS

1. Evaluate and simplify expressions containing rational exponents
2. Understand irrational exponents; graph exponential equations
3. Define, simplify and evaluate exponential functions; $y = e^x$
4. Find the composition of functions; recognize inverse functions
5. Solve equations and evaluate expressions involving logarithms
6. Use common logarithms to compute powers and roots
7. [illegible] exponential and logarithmic equations

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8. Use natural logarithms to solve problems

9. Use exponentials & logarithms to solve technical application problems

CHAPTER 11 - THE STRAIGHT LINE

1. Write equations of lines that are parallel or perpendicular

2. Prove geometric theorems analytically

3. Find the measures of angles formed by intersecting lines

4. Write linear equations in normal or standard form

5. Find the distance from a point to a line or between parallel lines

CHAPTER 12 - CONICS

1. Write the equation of and graph circles

2. Write the equation of and graph parabolas

3. Use the translation formulas to simplify the equations of conics

4. Write the equation of and graph ellipses

5. Find the eccentricity and length of the latera recta of an ellipse

6. Write the equation of and graph hyperbolas & their asymptotes

7. Find the eccentricity & the length of the latera recta of hyperbolas

8. Recognize conic sections by their equations

9. Graph and solve systems of second- degree equations & inequalities

10. Use conics in technical applications

CHAPTER 13 - PROBABILITY

1. Solve problems using the Basic Counting Principal, linear permutations

2. Solve permutations involving repetitions and circular permutations

3. Solve problems involving combinations

4. Find the probability and odds for success or failure of an event

5. Find the probabilities of independent and dependent events

CHAPTER 14 - DESCRIPTIVE STATISTICS

1. Find the mean, median, mode & range of a set of data

2. Find mean deviation, standard deviation & semi-interquartile range

3. Organize data using a frequency distributation

4. Draw graphs which represent the data in frequency distributions

TECHNICAL MATHEMATICS

GEOMETRY REVIEW, CALCULATOR EXERCISES — PP. 391 - 406, 43 - 45

ALGEBRA REVIEW — PP. 3 - 27, 78, 215 - 227

Text Section	Technical Supplement	Topic
CHAPTER 1 - LINEAR RELATIONS AND FUNCTIONS		
1.1	2A, 2D, 2F	Relations and Functions
1.2	2E, 2G, 2F	Linear Functions
1.3	20A	Distance and Slope
1.4	4A, 20E	Forms of Linear Equations
1.5	2H, 2I	Linear Inequalities in Two Variables
1.6	4B	Maximum or Minimum of a Polygonal Convex Set
1.7	16C, 16D, 16E	Linear Programming
CHAPTER 2 - THEORY OF EQUATIONS		
2.1	6B	Polynomial Equations
2.2	6C, 6D	Quadratic Equations and Imaginary Roots
2.3	6E	Synthetic Division
2.4	6F	The Remainder and Factor Theorems
2.5	6G	The Fundamental Theorem of Algebra
2.6	6H	The Rational Root Theorem
2.7		Locating Zeros of Functions
CHAPTER 3 - MATRICES AND VECTORS		
3.1	4D, 4F	Matrices and Determinants
3.2	4E	Addition of Matrices
3.3	15C	Multiplication of Matrices
3.4		Inverses of Matrices
3.5	15A, 4G, 4I	Augmented Matrix Solutions
3.6	8A, 8B	Geometrical Vectors
3.7	8E	Algebraic Vectors
3.8		Vectors in Space
CHAPTER 4 - THE CIRCULAR FUNCTION		
4.1	7A	The Wrapping Function
4.2	7B	The Circular Functions
4.3	7C, 7D	Finding Values of Circular Functions
4.4	9A	Graphs of the Circular Functions
4.5		Addition Formulas
4.6	(19D)	Double and Half Number Formulas

CHAPTER 5 - THE TRIGONOMETRIC FUNCTIONS

5.1		Trigonometric Functions of an Angle
5.2		Using Trigonometric Tables
5.3	19A, 19B	Basic Trigonometric Identities
5.4		Verifying Trigonometric Identities
5.5	7E, 7G, 7F	Radians and Arc Length
5.6		Functions of Angles
5.7		Functions of Quadrantal Angles
5.8	19C	Functions of (a + B)
5.9		Functions of Double Angles and Half Angles

CHAPTER 6 - GRAPHS & INVERSES OF THE TRIGONOMETRIC FUNCTIONS

6.1		Graphs of the Trigonometric Functions
6.2	9B, 9C	Amplitude, Periods, and Phase Shift
6.3	9D, 9G, (9H)	Graphing the Trigonometric Functions
6.4		Graphing Compound Functions
6.5	19G	Inverse Trigonometric Functions
6.6		Principal Values of the Inverse Trig. Functions
6.7		Graphing Inverses of Functions

CHAPTER 7 - APPLICATIONS OF TRIGONOMETRY

7.1	19E, 19F	Solving Trigonometric Equations
7.2	3E - 3M	Right Triangles
7.3	8K, 8M	The Law of Sines
7.4	8L, 8N, 8O	The Law of Cosines
7.5	6J	Area of a Triangle
7.6	8C, 8D, 8F, 8G	Vector Triangles

CHAPTER 8 - SEQUENCES AND SERIES

8.1	18A, 18B	Arithmetic Sequences and Series
8.2	18C	Geometric Sequences and Series
8.3	18D	Infinite Sequences
8.4		Sum of an Infinite Series
8.7		Binomial Theorem

CHAPTER 9 - POLAR COORDINATES AND COMPLEX NUMBERS

9.1		Polar Coordinates
9.2	20J	Graphs of Polar Equations
9.3	(20J)	Polar and Rectangular Coordinates
9.4	11A	Simplifying Complex Numbers
9.5	11B, 11C	Polar Forms of Complex Numbers
9.6	11C, 11F	Products & Quotients of Complex Numbers (Polar)

CHAPTER 10 - EXPONENTIAL AND LOGARITHMIC FUNCTIONS

10.1	10A, 10B, 10C	Rational Exponents
10.2	12D	Exponential Functions
10.3	12B	The Number e
10.4	2B, 2C	Composition and Inverses of Functions
10.5	(12D), (12E)	Logarithmic Functions
10.6	12B, 12N	Common Logarithms
10.7	12H, 12I, 12N	Exponential Equations
10.8	12B,12L,12M,12K	Natural Logarithms

CHAPTER 11 - THE STRAIGHT LINE

11.1	20D	Parallel and Perpendicular Lines
11.2		Analytic Prdofs
11.3		Angles of Intersecting Lines
11.4	20C	Normal Form of a Linear Equation
11.5		Distance from a Point to a Line

CHAPTER 12 - CONICS

12.1		The Circle
12.2	6I, 20H, 20I	The Parabola
12.3	20H	Translation of Axes
12.4	20I	The Ellipse
12.5		More about the Ellipse
12.6	20I	The Hyperbola
12.7		More about the Hyperbola
12.8	20G	Conic Sections
12.9		Systems of Second-Degree Equations,Inequalities

CHAPTER 13 - PROBABILITY

13.1		Permutations
13.2		Repetitions and Circular Permutations
13.3		Combinations
13.4	21B	Probability
(13.5)		Probabilities - Independent & Dependent Events

CHAPTER 14 - DESCRIPTIVE STATISTICS

14.1		Measures of Central Tendencies
14.3		Measures of Variability
14.4	21C	The Frequency Distribution
14.5	(21E)	Graphical Representation of Data

Teaching Grammar Through the Writing Process
English IV
Tech-Prep

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Easley, South Carolina
August 15, 1988

Teaching Grammar Through the Writing Process
English IV
Tech-Prep

A review of current literature concerning the teaching of grammar and writing has led me to the following conclusions:

1. Grammar drills are useful primarily for determining whether a concept is understood.
2. Once a concept is understood, it is quickly forgotten unless it is integrated into the student's writing.
3. Such integration will not occur unless the student is motivated to write in a grammatically correct fashion.
4. The teacher's job is therefore two-fold: to see that the student understands correct sentence structure and to motivate the student to use correct sentence structure.

Too often, in elementary years, extensive drills are substituted for extensive concept instruction in sentence structure. A drill should be primarily a method of determining which students understand the concepts that have been presented and of providing immediate reinforcement of those concepts. Drills are almost useless and may be counter-productive unless further instruction is offered to those students who have not understood the concept. Non-verbally-adept children who never quite understand a particular concept learn to hold their collective breath and sit very still during grammar drills which typically follow brief class lectures on that concept; sympathetic teachers tend to avoid calling on students who may not know the answer; if those students are called on, they guess, breathe a sign of relief when the spotlight moves on, and hope that the test will not contain too many items dealing with that concept. If a patient and determined teacher works with them until the concept is grasped, those students will most likely dismiss it from their minds and lapse into more comfortable sentence structure as soon as the unit is over unless their motivation to improve their grammar transcends grades. Even then, a student does not "own" a concept until he begins to integrate it into his writing and speech patterns.

It is for this reason that in recent years most literature dealing with teaching grammar has focused on motivation and on the integration of correct grammar into writing. However, it is my feeling that more study on concept instruction is needed . Unquestionably, the most painless method of learning correct sentence structure is through reading, as long as reading can be made less painful for the non-verbal student. The most painful (and in my opinion, most thorough) method of learning correct sentence structure is through diagramming sentences. I have echoed an ongoing debate.

Various techniques offered for providing motivation fall into two categories: artificial and natural motivation. Artificial motivation is teacher-structured and, like vitamin capsules, may be effective but can be unpleasant, especially if chewed instead of swallowed whole. It is necessary, however, for those students who refuse to be motivated: who have no interest in being motivated: who will NOT be motivated. It includes such methods as grades, re-writing until the teacher says "I cannot bear to read this paper again," (typically two or three token revisions after the student has said "I cannot bear to write this paper again,") writing rules x number of times, and grades. Natural motivation, like natural food, is better. One form of providing natural motivation which has met with great success in the classroom is "writing for a purpose"--writing for public consumption. Another form of motivation, the one which teachers have been offering with less success for generations, is to convince the non-verbally-oriented student that verbal competence increases his chances for success in life. It is in this area that the PACE program offers hope to the high school English teacher. Its promise will be fulfilled if the high school student will, early in his high school career, set his sights on an Associate's Degree and can be convinced that the verbal competencies he is offered in high school are necessary for success in technical school and that the verbal competencies offered in technical school will increase his chances for success in life.

The goals of English 126-127 as currently structured at Tri-County Tech are the same as the goals of high school English classes. It is my suggestion that the student who enters the 2 + 2 program as a Junior in high schol be offered a more immediate motivation than "this will help you in your career." A career seems very far away to a fifteen-year old. Instead, tell him that if he masters his high school English work, he can exempt 126-127. Perhaps four units of English could be required for an Associate's Degree--126-127 (which could be exempted) or 101-102 (which already can be exempted through the AP exam), and two courses from such offerings as Speech 101, English 166, Technical Writing, or Interpersonal Communications in the Workplace (a course which could include a smattering of psychology and law as well as verbal skills).

The curriculum introduced here is one attempt to combine a formal grammar review, a strong writing program which focuses on process and self-editing, and a classroom structure which reminds students of their career goals, encourages group interaction, and allows the teacher time to work individually with students who have held their collective breath, sat very still, and hoped for the best during grammar lessons year after year after year. The work individually with students who have held their collective breath, sat very still, and hoped for the best during grammar lessons year after year after year. The S.C. Department of Education mandates that 50% of high school English classes' curriculum be literature. Focusing on developing reading skills will be helpful to Tech-prep students, as will discussions which center on goal-setting, ambition, success and failure, and interpersonal relationships--the stuff most literature is made of.

Using the "UGE Sheet"

At the beginning of the year, each student will be given a copy of the following handouts which he will keep in his English notebook:

1. Unacceptable Grammatical Errors
2. UGE Exercises
3. UGE Record
4. Spelling Record

The handout "Unacceptable Grammatical Errors" is a variation of the classic "Theme Penalty Sheet" once used by most college English departments. It presents a realistic target for improving students' sentence structure. During the first nine weeks, the teacher will review each item listed on the UGE Sheet before she begins to mark that error on students' writing.

During the first nine weeks, at least two days a week will be set aside as group work days. On these days, students will use the "UGE exercises" handout to test themselves on grammatical concepts which have been reviewed in class. Keyed copies of the workbooks will be available for students to check themselves. Any student who discovers that he has not achieved mastery of a particular concept should go back and study the book and get help from the other members of his group. He should only ask the teacher's help when the entire group is stumped on a particular concept. He can then test himself again. When a student is confident that he understands the concepts measured on the tests listed on the "UGE exercises" handout, he may ask the teacher to administer the test. He will be tested on each skill only once and the grade will count, so he should not take any test until he is sure he can do well on it. All tests must be completed by the end of the first nine weeks' grading period.

(Students who work quickly and successfully through all the tests will be allowed to work on writing assignments and to take advantage of a classroom "Reading Corner" to complete required and extra credit book reports.)

During the second nine weeks, the teacher will begin using the numbers on the "UGE sheet" to mark errors on students' final drafts. The number of the error will be placed in the margin of the line(s) where the error occurs. Students will then be required to

1. Keep a record of the occurrence of each error on the "UGE Record Sheet"
2. Write an explanation in his own words of the reason the sentence is not correct as written and write a corrected version of the sentence.[1]

Spelling errors will be recorded on the "Spelling Record Sheet" and the teacher will work with students to recognize patterns in spelling errors.

By the third nine weeks, the teacher should be able to encourage self-editing by marking numbers at the bottom of the page where the error occurs and should be able to concentrate on finer points of grammar and usage on most student's papers.

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1. David Drost, "Errors Analysis: Fewer Errors and Faster Grading," Classroom Practices in Teaching English 1979-1980: How to Handle the Paper Load (Urbana, IL: National Council of Teachers of English, 1979).

Unacceptable Grammatical Errors

The following errors are considered so serious that they are totally unacceptable in any written work (unless they are intentionally used for purposes of humor or character development).

1. the sentence fragment
2. the run-on sentence (comma splice. fused sentence)
3. use of the semicolon between noncoordinate elements
4. disagreement of subject and verb
5. pronoun usage: error in case or agreement of a pronoun
6. verb usage: error in the principal parts of a verb. including failure to write _d_ or _ed_ for the past tense or past participle of a regular verb
7. error in the use of the apostrophe

Unacceptable Grammatical Errors
Review Exercises

Below is a list of pages and exercises covering each of the major errors. Keys are provided in marked copies of the books.

error	handbook	HBJ text	red wkbk	blue wkbk	brn wkbk
1. fragment	4.0- 4.3 pp. 435-431	pp. 509-511	pp.78-81	pp. 97-104	pp. 123-12
2. run-on sentence	4.4- 4.5 pp. 441-445	pp. 508-509, 512-513	pp. 82-84	pp. 105-110	pp. 129-13
3. semicolon	12.1- 12.3 pp. 550-553	pp. 566-568	p. 63	-----	p. 77
GRAMMAR TEST #1					
4. subject-verb agreement	5.0- 5.12 pp. 446-459	pp. 421-430	pp. 150-153, 155-157	pp. 125-126	pp. 13-18
GRAMMAR TEST #2					
5. pronoun usage	6.0-6.16 pp. 460-482	pp. 390-400, 485-486	pp. 157-159, 168-182	pp. 137-140, 147-154	pp. 55-66
GRAMMAR TEST #3					
6. verb usage	8.0- 8.8 pp. 492-511	pp. 409-421, 430-433	pp. 190-204	pp. 165-178	pp. 25-38
GRAMMAR TEST #4					
7. apostrophe	13.0- 13.9 pp. 559-565	pp. 573-575	-----	pp. 39-46	pp. 169-17
GRAMMAR TEST #5					

UGE RECORD SHEET

Instructions:

1. In the first column, write the date of your paper.
2. In the second column, list the number and type of EACH UGE error on your paper.
3. Place a check in the third column when your corrections have been accepted and all drafts of your paper with the corrections have been filed in your folder.

date	error	corrected & filed
August 26	#3 Semi-colon (2 errors)	✓
"	#6 Verb usage (1 error)	✓

SPELLING RECORD SHEET

Instructions:

1. In the first column, fill in the date of your paper.
2. In the second column, copy the incorrectly spelled word. If you have spelled it incorrectly more than once, indicate in parentheses the number of times you misspelled it.
3. In the third column, spell the word correctly.
4. In the fourth column, refer to a dictionary to write the word in syllables.

date	incorrect spelling	correct spelling	syllables
Aug 26	superlitive	superlative	su-per-la-tive

The Writing Program

The writing program will focus on process. Grammatical corrections will be made only on final drafts. Students will be encouraged to edit their own work and to edit each other's work before final drafts are submitted. Teacher comments on earlier drafts will be confined to suggestions about overall structure, audience, tone, etc. Students will write something every day. They will keep personal journals and reading logs. Both will be treated as pre-writing or brainstorming and the teacher may respond to content but will not criticize in any way.

The focus the first nine weeks will be on paragraph structure.

During the second nine weeks, the class will work with the five paragraph essay and will discuss various types of writing, especially narration and description.

During the third nine weeks, the class will write an expository essay and a persuasive letter.

During the fourth nine weeks, each student will write a research paper on a career. An interview will be required.

Whenever there is an unusual incident, students will fill out "Incident Reports." Students who are assigned detention will fill out a report form. Group projects will be completed only when the group files a written report. Students will be expected to keep records of errors and of their grades.

Theme Correction Form

Follow the following procedure when correcting your theme. Ask a classmate for help if necessary. Ask the teacher as a last resort only. You will learn best when you accept the responsibility for your errors. Write theme corrections on a separate sheet of paper in the same order that they occur on your paper (see example).

numbered errors

A. The numbers on your paper correspond to errors listed on the UGE sheet. If you cannot locate the error or do not really understand what is wrong about it, review the pages listed for that error on the "UGE Exercises" handout.

B. In your own words, write an explanation of why the sentence is incorrect as you have written it. Then write a corrected version of the sentence. The explanation must be specific. For example, "This is a sentence fragment" is not acceptable; "This is a sentence fragment because I do not have a verb in the main clause" is acceptable.

C. Record the error on your copy of the "UGE Record Sheet."

teacher comments

A. If you do not understand the comment and no one in the group can help you with it, ask the teacher to explain the comment either during group work time or before or after class.

B. Write a specific explanation of what is wrong with the sentence or paragraph. "This is a poor topic sentence" is not acceptable: "This is a poor topic sentence because the main idea of my paragraph is the way people should treat their friends, but I don't mention that in the topic sentence" is an acceptable explanation.

spelling errors

A. Write the word correctly five times on your correction paper each time it is misspelled.

B. Complete an entry on the "Spelling Record Sheet" for each misspelled word. If a word is misspelled more than once in one theme, it is only necessary to complete one entry for that word. However, if it is misspelled on another theme, another entry must be completed for that word.

Notebook Standards

You will need a ring binder with 1 1/2" rings, and a set of tab dividers. This notebook is to be used for English class only. All English work will be kept in the notebook; nothing should be removed without Mrs. Johnson's permission. The five sections should be labeled: Literature, Grammar-Spelling, Writing Assignments, Reading Log, Journal.

Your notebook will be graded according to the following standards:

An A notebook: is properly set up and is very neat and legible. All assignments have been carefully done; many show extra effort and care. Record sheets are up-to-date; journal and reading log entries clearly show that much time and thought has gone into them. Notes are complete and original and well-organized.

A B notebook: is properly set up and is very neat and legible. All assignments have been carefully done; some show extra effort. Record sheets are up-to-date; journal and reading log entries are thoughtful and most are well-developed. Notes are complete and original.

A C notebook: is properly set up and is neat and legible. The notebook contains all assignments; record sheets are up-to-date; journal and reading log entries are thoughtful. Notes are complete and original.

A D notebook: is properly set up and is legible and relatively neat. The notebook contains most assignments; record sheets are up-to-date; effort has been made to keep a reading log; journal entries are short and poorly developed. Notes have been taken incompletely.

Notes on Classroom Structure
English IV
Tech-Prep

I hope to teach more than English literature and grammar through my classroom structure. I intend to rely heavily on groups to encourage cooperative effort, peer editing and proofreading techniques as well as peer tutoring, and to give the students a feeling of control over their learning experience.

Each group will consist of four or five students, and will have a "group manager" and a "secretary." These positions will rotate regularly so that everyone in the group will take a turn at each of these positions. Many assignments will be geared to group effort: the secretary will do the writing for the group: the manager will be expected to keep the group on track. If the group does not complete its assignments in a reasonable amount of time, the manager will be expected to file a written report justifying the group's failure to complete the project.

Whenever there is an unusual incident in the classroom, whether positive or negative, the members of the group most closely involved will all fill out "Incident Reports." The group should benefit from comparing versions of the incident. At times, the entire class will write and compare "Incident Reports." This assignment will give me an opportunity to teach basic principles of business writing. It should also prove invaluable in disciplinary procedures.

Groups will initially be assigned alphabetically, but as soon as I have administered diagnostic grammar tests and have received writing samples, I will reassign groups for balance. I also administer the Meyers-Briggs Personality Test and will use those results in choosing the first managers and secretaries--I want to begin with those who will set high standards for the others to follow.

Group format should give the students some freedom, but, paradoxically, such freedom is only possible within rigid guidelines. Average-track students tend to be easily distracted, so rules about participation and working on task must be consistently enforced. I have chosen to use an "overtime" concept--work which is not done to the best of the student's ability when assigned must be done after school. A student who is "goofing off" is not working to the best of his ability.

Record-keeping skills are an important part of the Tech-Prep program, so I have prepared a "Grade Record" form for the students to keep track of their own grades. This form also will serve as a syllabus and will show the students in advance the consequences of poor grades in any area.

INCIDENT REPORT

Date of incident:

Time of incident:

Location of incident:

Persons involved:

Description of incident:

Form completed by: (Check one)

_____ person involved _____ witness _____ supervisor

____
(signature)

____
(supervisor)

OVERTIME ASSIGNMENT

Date:

________________________________ is assigned overtime

work on ________________________________. Report to

________________________________.

Comments:

____
(student signature)

____
(teacher signature)

OVERTIME ASSIGNMENT

Date:

________________________________ is assigned overtime

work on ________________________________. Report to

________________________________.

Comments:

____
(student signature)

____
(teacher signature)

GRADE RECORD

Use this sheet to keep track of your progress.

All homework, classwork, and pop quiz grades are pass-fail. Only work which is done carefully and completely and handed in on time will pass. Each time you pass one of these assignments, you add 5 points to your total score: each time you fail one, you subtract 5 points. Use the back of this sheet to keep track of assignments and dates for points earned and lost.

Grammar test 1 ________

Grammar test 2 ________

Grammar test 3 ________

Grammar test 4 ________

Grammar test 5 ________

Literature test X 2 ________

Paragraph 1 ________

Paragraph 2 ________

Notebook ________

grade total: ________

+ points   - points

Book reports: 10 points
#1 (required)
#2 (required)
#3
#4

Homework, pop quizes,
daily grades: 5 points

total +/-points: ________ ________

+/- balance: ________

total points: ________ ÷ 10 = ________
(GRADE)

TRANSITION TO COLLEGE MATHEMATICS

A HIGHLY NUMERICAL PROBLEM SOLVING APPROACH TO ALGEBRA AND GEOMETRY WITH SIGNIFICANT DEPENDENCE ON GRAPHING AND CALCULATORS.

INTENDED AUDIENCE

1. COLLEGE - INTENDING SENIORS.
2. STUDENTS WILLING TO DO HOMEWORK ON A DAILY BASIS.
3. SCORE ON DIAGNOSTIC TEST (TRANSITION) LESS THAN 20.

STUDENT CHARACTERISTICS

1. HAVE NOT BEEN SUCCESSFUL IN THE COLLEGE PREPARATORY CURRICULUM.
2. TRADITIONAL STRUCTURED REVIEW DOES NOT WORK; STUDENTS BEGIN AGAIN FROM ANOTHER VANTAGE POINT.
3. HAVE NOT INTEGRATED CONCEPTS AND SKILLS; EACH IDEA AND CONCEPT LEARNED AS A DISTINCT AND SEPARATE ENTITY.
4. HABITUALLY SEEK AN ALGORITHM TO APPLY RATHER THAN EMPLOYING PROBLEM SOLVING SKILLS.
5. INITIALLY DO NOT READ EXPLANATORY MATERIAL AND MUST BE LED THROUGH THE PROCESS.

COURSE CHARACTERISTICS

1. EMPHASIS ON PROBLEM SOLVING.
2. PROBLEMS SET IN INSTRUCTIONAL & INFORMATIVE CONTEXTS.

(Introductory material for the "Transition to College Mathematics" course developed in during the project's first year by representatives from the School District of Pickens County, PACE and Tri-County Technical College. The entire course syllabus includes 10 units and a list of supplementary materials.)

INTRODUCTION

Between 1975 and 1980 remedial mathematics enrollments in four-year colleges and universities in the United States rose by 72 percent; during the same period, undergraduate mathematics enrollments in these same institutions rose by only 22 percent. A high percentage of university and college programs now require university-level mathematics, but many freshmen are not prepared for these courses. Thus large numbers of students need courses in mathematics that provide a bridge into required courses.

Transition to College Mathematics was written from the experience of the authors with both large numbers of university freshmen in remedial classes and with approximately 1,500 high school seniors in a two-year project to develop an alternative senior year course. These instructional materials are equally appropriate for a first mathematics course in a two-year or four-year college, or for a last course in high school for college-intending students with serious deficiencies in mathematics.

The purpose of the introduction is to provide an overview of this non-traditional course, to clarify what is meant by a numerical approach to algebra and geometry, to discuss the role of the calculator, problem-solving, and graphing in the course and to describe ways of using the text and tests. We start this discussion with characteristics of students who have typically been in our classes.

Student Characteristics

Students for whom this course was designed have several readily identifiable characteristics. First, and most obvious, is that of not being successful in the college preparatory curriculum. For the most part they have not quite kept up and have not quite achieved control of the ideas and skills. After one, two or three years of marginal success, they typically are disheartened by the prospect of enrolling for another year of mathematics. Our experience in working with these students as college freshmen and as high school seniors indicates that most must begin again at basic levels in mathematics. Re-examining basic concepts from another vantage point is more fruitful than a traditional structured review of the concepts and skills over which they did not have working control in previous courses. The fact that these students score at close to chance on university placement tests indicates they have little grasp of fundamental ideas of algebra, almost no algebraic skill, and even less understanding of geometry.

Typically, the students have not integrated concepts and skills; rather each idea and concept has been learned as a distinct and separate entity. Hence, the materials have been designed to feature the relationships between ideas in mathematics. Rather than ignoring the problem of students not being

- Fundamental meanings of operations are reinforced. To use the constant key and count the repeated multiplications to produce the power of a number provides a strong underpinning for the imagery you want students to associate with exponents. The use of the division key with every fraction exercise emphasizes the relation of quotient with fraction.

- Ideas that are commonplace but not well-learned are reconsidered. Analysis of written mathematics to construct a keying sequence that will produce the desired answer forces students to rethink order of operations.

- Special characteristics of the calculator and of particular keys suggest new, important concepts. For example, an appreciation of error is developed when students encounter the fact that the display number for a fraction with an infinite repeating decimal differs from the number that the calculator uses in computation with the infinite decimal.

- The calculator allows problems to be more realistic and complex. Many significant problems are not readily accessible with paper and pencil techniques. For example, graphing large numbers of points to establish the characteristics of a curve is feasible with the calculator.

- Students can use guess and check or use successive approximation techniques to solve problems that they lack algebraic techniques for solving. This activity has the additional advantage of creating intuitions about particular problem settings that are otherwise hard to come by. For example, it is quite feasible to determine numerically when $4000 invested at 13.5% compounded quarterly will double in value. Typically, the solution to this problem would demand logarithms or interest tables; the calculator allows calculated trial and error or more systematic guess and check techniques.

In brief, the calculator not only establishes and reinforces fundamental ideas, it also allows the student to create enough numerical evidence to make generalizations about important new problem settings. It allows the student to solve problems before they are ready for a formal approach to these problems.

Emphasis on Problem Solving

Students at this level must do large numbers of problems on a daily basis. The course depends on a collection of problems that are broader in scope than typical textbook problems and which weave through the course, being approached first arithmetically through numerical computation, later geometrically with graphic representation, and finally algebraically by the writing and solving of equations.

In this course overview it is possible to examine only a small sample of problems. The following illustrate fundamental characteristics of the course and are provided to suggest its flavor. These examples are chosen

Comment: A key weakness for these students is lack of sense of number order and magnitude. We find this level student is unable, for example, to locate finite decimals between -1 and 1. Extensive work with the number line and graphing helps develop intuitions about order properties.

4. Students encounter concepts and relationships informally in problem settings before the concepts are formalized.

Problem: Assume that a bacteria culture has a doubling period of ten hours. Show the number of bacteria in the culture at the indicated times.

Age of culture (hours)	Number of bacteria in culture
0	1000
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	2(1000) = 2000

Comment: In solving this problem a student experimentally finds approximations to $2^{1/10}$, $2^{2/10}$,...before fractional exponents are presented formally. Calculators make this possible. Similarly students solve equations, use scientific notation, and reason with ratios in numerical settings before these concepts are formalized and algebraic techniques developed.

5. Students find numerical solutions to problems using successive approximations before they write equations to solve problems.

Problem: Various amounts of water are added to dilute 10 gallons of a 20% salt solution. Complete this chart. How many gallons of water must be added to 10 gallons of a 20% salt solution to give a 15% solution?

Amount of water added (gal)	Amount of new mixture (gal)	Amount of salt in new mixture (gal)	% of salt in new mixture
.5	10 + .5	.20(10)	$\frac{.20(10)}{10 + .5} = 19.05\%$
1	10 + 1	.20(10)	
2			
			15%

8. Graphing is used to give students concrete representations of functional relationships before dealing with them algebraically.

Problem: Divide the interval $-4 \leq x \leq 4$ into 32 equal pieces.

a) Compute the value of $y = \frac{1}{x^2 - 1}$ at the 33 values of x you have marked and graph the points (x,y).

b) Describe the behavior of the graph near $x = 1$.

c) Use your graph to find values for x for which $\frac{1}{x^2 - 1} = -1$; for which $\frac{1}{x^2 - 1} = 0$.

Comment: Dividing an interval into a given number of congruent pieces is an important part of this problem. Initially a graph is a collection of large numbers of points. Students work in groups to do the computation and plotting. They develop a strong geometric sense and think of algebraic equations in terms of their graphs. In the latter part of the course, finding solutions to equations and inequalities are geometric questions.

Repeated Use of Problem Contexts

A distinguishing characteristic of the course is that problem situations are often revisited. Many problems are investigated first numerically, later geometrically, and finally algebraically. To illustrate this flow we give below three formulations of a single problem.

Problem: Mary Ellen has invested $17,500 at 9% and the rest at 7% simple interest.

Numerical Approach (from Chapter 2)

Complete the following chart to show several possibilities. Then find the amount of money invested at 9% and 7% if Mary Ellen's annual interest is $1505.

Amount invested at 9%	Amount invested at 7%	Annual interest
4,000	17,500 - 4,000 = 13,500	.09(4000) + .07(13,500) = 1305
8,000	9,500	
16,000		

the problem type. They are more inclined to make conscious decisions about which solution process to use.

More importantly, with more tools to use the students are able to get started on any problem. On examinations where students are permitted to solve problems similar to those above in whatever way they choose, many will elect a numerical or graphical approach even though algebraic methods are available. The more typical mathematics course tells the student to start a problem solution by representing the problem algebraically with equations. The result has been that many students do nothing. Our students have at least two more points of entry into the problem.

* Important elements of general literacy are more likely to be learned. Several of the problem settings that have been selected for revisiting concern topics that are significant to functioning as a literate adult. We feel, for example, that topics such as population growth and compound interest are important components of general literacy. Revisiting the topics in several problem settings allows the successful learner to elaborate and extend understandings on second and third encounters. For the student who was not successful initially or who was absent, revisiting the topic provides an opportunity to learn what would otherwise be missed.

Time Schedules

This book has been written for a full year course. The pace is intended to be brisk so that students develop patterns of solving problems and studying outside class every day. Chapters 1-6 can be covered in one semester, Chapters 7-11 in a second semester. For schools that are on a quarter system, the material separates naturally into Chapters 1-4 for the first quarter, Chapters 5-8 for second quarter, and Chapters 9-11 for third quarter. Teachers with less time may choose to omit later sections of the book. In a rapidly paced version of the course at Ohio State, the text is covered in two quarters with Sections 7.7, 9.8 and 11.5 omitted.

The time schedule below anticipates 160 full class periods, including review lessons and chapter tests, and suggests approximately how many periods will be needed for the instruction of each chapter.

Chapter	1	2	3	4	5	6	7	8	9	10	11
Number of Days	12	14	15	10	14	15	18	10	18	15	19

Using the Text

You will find the explanatory material and the illustrative examples in the text more extensive than is true for most texts. The approach is more deliberate and more verbal. Our experience with the field-test classes suggests that students can learn to read the material with understanding — but are not likely to do so without your help. You will need initially to calculators. It will help you identify students whose mathematics preparation exceeds that for which this course was developed. Our experience suggests that students with scores above 19 do not need this course; they should be moved to a more appropriate course in your program. Students with scores between 15 and 19 may be able to begin a mathematics course above the level of this one; they should be advised individually on the basis of their previous experience in mathematics. The course is actually intended for students whose scores on the diagnostic test are 14 or below. If students with higher scores are permitted to take the course, you will need to be very careful that these students do not influence the pacing or the level of presentation in the course. Generally strong efforts should be made to restrict the course to those students with serious deficiencies in mathematics, that is to say, most students with diagnostic scores 14 or below.

The chapter tests have been constructed in anticipation of 40 minutes of work time and thus should be appropriate for a single class period. The semester examinations are each constructed in three parts: Part I is written for 40 minutes testing time, Part II for 20 minutes, and Part III for 20 minutes. It is assumed that all classes will use Part I and that classes with examination periods of one hour or more will add Part II or Parts II and III to complete the time.

An observation about quizzes is in order. We encourage frequent quizzing to keep student performance up and to provide feedback about student learning. Further, we urge that quizzes be kept short. Two to four problems designed for five to ten minutes working time can serve these purposes quite effectively.

Prognosis for Success

In spite of their initial mathematical deficiencies, students in our classes have exhibited positive attitudes and have been generally conscientious in their study. Their motivation is higher than we may have anticipated; the future seems very real to them. That they use calculators systematically for the first time and achieve a new level of success in mathematics are additional motivating factors. Most consistently perform at acceptable levels in extensive daily homework assignments. In short our classes have confirmed our belief that these students can succeed. We are hopeful that your classes will provide the same response.

For most of these students mathematics has not been a success story. Many have low self-concepts with respect to mathematics. Some will have experienced mathematical anxiety. Too many will have settled for modest performance levels in mathematics. The numerical approach using the calculator can help students get off on the right foot in this course. They are likely to enjoy a new level of success in computational mathematics. They will be able to solve problems that eluded them in the past. They can begin to do mathematics with confidence and their motivation will be high. You can capitalize on this! Set high levels of expectation and let them know that you believe they can meet these expectations.

1.1 Instructing the Calculator

To illustrate the need for an agreement on an order of operations, you might ask students first to evaluate expressions like $2 + 6 \times 4 \div 2$ without consultation or calculators. Then insert parentheses to represent as many answers as possible, e.g.

$$(2 + 6) \times (4 \div 2) = 16$$

$$(2 + (6 \times 4)) \div 2 = 13$$

$$2 + ((6 \times 4) \div 2) = 14$$

Then ask students to key the original expression in order (with no parentheses) to see how their calculator interprets the expression. For demonstration purposes, you may want to provide at least two calculators using different logics and observe how they process the information differently. Of course, you will want all students to use a calculator with algebraic logic (e.g. TI30) after this point.

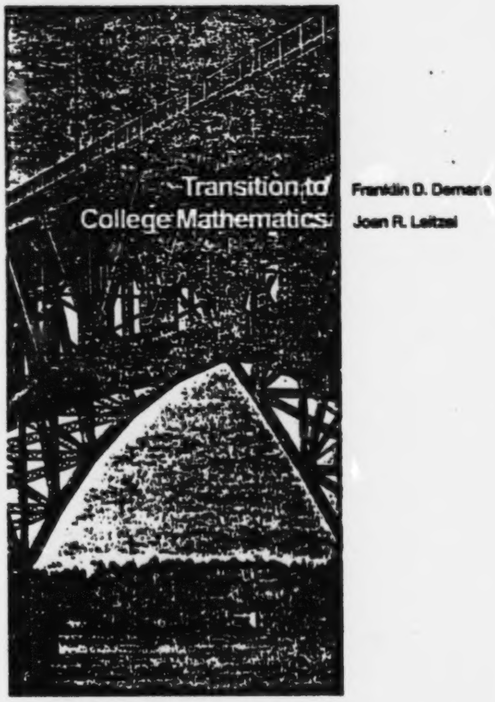
From such examples, you can derive the rule for order of operations as given in the text. Emphasize that parentheses are like punctuation marks in the language of mathematics. They enable us to communicate which operations are to be performed in what order if we intend something other than the usual hierarchy.

As you explore the illustrative examples in the text, ask students to key the alternative sequences and observe their calculator displays. They should become aware of which operations are performed and which are pending at each step. As suggested in the materials, require translation in both directions between keying sequences and mathematical phrases. You may read, or have students read, English expressions (as in Example 4) using voice fluctuations and pauses to try to communicate an intended order of operations. This will help to dramatize the need for a rule that permits consistent translation between verbal and mathematical sentences.

Although it may seem cumbersome, it is important to use ☐'s when representing keying sequences at the chalkboard or on the overhead projector. This will forestall the natural inclination of students to simply drop the ☐'s when translating keying sequences to mathematical phrases and will avoid miscommunication of keying sequences involving $\boxed{x^2}$, $\boxed{y^x}$, etc.

Addison-Wesley
Presents

A new concept in developmental math texts



This new and exciting developmental mathematics text is the result of an extensive project aimed at improving students' skills to prepare them for college-level math courses. It is a fresh approach to developmental mathematics and a unique contribution to mathematics education.

Transition was written especially for students who have been unsuccessful with formal, axiomatic approaches to mathematics. In this new book problems are often first approached arithmetically through numerical computation, then geometrically with graphic representation, then algebraically by writing and solving equations. This shows students three ways to get started on a problem and at the same time helps them understand the relationship between charts, graphs, and equations.

Transition requires no working skills in algebra. It does ask students to use a pocket calculator frequently because this will give them insight into arithmetic properties and provide access to more demanding problems. Every chapter is followed by a large number of problems to help students develop their problem-solving skills. The range of problems is very broad and the settings are informative and realistic.

The material in **Transition** has been class-tested in 41 high schools and at Ohio State University. It has been proven effective. Students who had trouble with and were discouraged by formal approaches to mathematics achieved significant new levels of success using **Transition to College Mathematics.**

Special Features

- Three different approaches to solving problems
- Broad range of problems in informative, realistic contexts
- A clear, informal writing style
- Instructor's Manual containing commentary on the text, discussions of key problems, tests, and answers

Addison-Wesley
Publishing Company, Inc.
Reading, Massachusetts 01867

SCHOOL DISTRICT OF PICKENS COUNTY

Dr. David E. Sawyer, Superintendent

DRAFT

CURRICULUM GUIDE
FOR

CONSUMER MATHEMATICS

CONSUMER AND CAREER MATHEMATAICS

August, 1989

Prepared by:

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Consultant: Elizabeth L. Lashley, Secondary Mathematics Coordinator
School District of Pickens County

(Introductory material for the revised General Mathematics III course. The entire syllabus includes 46 pages listing topics, objectives, standard test and text references and suggested supplementary materials.)

CONSUMER / CAREER MATHEMATICS
TIMELINE

CONSUMER	# WEEKS
301 Calculating Skills	1
302 Fractions and Percents	1.5
303 Personal Income	1
304 Banking	2
305 Consumer Credit	1
306 Money Management and Investments	2
307 Housing and Home Improvements	2.5
308 Insurance	1.5
309 Transportation	1.5
310 Taxes	2
311 Fundamentals of Economics	1
312 Probability and Statistics	2

1 week - Skill Drill and Reviews

2 weeks- Algebra and Geometry

CAREER	#WEEKS
C301 Introduction	1.5
C302 Applications of Measurement	2.5
C303 Applications of Algebra	3.5
C304 Applications of Geometry	2.5
C305 Applications of Trigonometry	2

1 week - Skill Drill and Reviews

3 weeks set aside for statewide testing and exams.

CONSUMER MATHEMATICS
TIMELINE

301 Calculating Skills	1 week
302 Fractions and Percents	2.5 weeks
303 Personal Income	1.5 weeks
304 Banking	3 weeks
305 Consumer Credit	1.5 weeks
306 Money Management and Investments	3 weeks
307 Housing and Home Improvements	4 weeks
308 Insurance	2.5 weeks
309 Transportation	3 weeks
310 Taxes	3 weeks
311 Fundamentals of Economics	1 week
312 Probability and Statistics	3 weeks

2 weeks - Skill Drills and Reviews
2 weeks - Algebra and Geometry
3 weeks - Statewide testing and Exams

CONSUMER MATHEMATICS

301 Basic operations	01 Add, subtract, multiply, and divide whole numbers and decimals. 02 Estimate sums, differences, products, and quotients using rounding.
302 Fractions and Percents	01 Add, subtract, multiply, and divide fractions and mixed numbers. 02 Find a percent of a number, and determine what percent a number is of another. 03 Use fractions and percents in problem solving situations. 04 Identify equivalencies among fractions, decimals, and percents.
303 Personal Income	01 Compute wages, salary, overtime rate, tips, and commission. 02 Compare various jobs based on wages and benefits.
304 Banking	01 To correctly complete deposit slips, checks, and check registers. 02 To reconcile a bank statement. 03 Compare various savings and loan plans. 04 Determine the interest earned on an account or interest paid on a loan.
305 Consumer Credit	01 Determine the advantages and disadvantages of using credit cards. 02 Determine the advantages and disadvantages of installment buying. 03 Compare the terms of various credit plans.
306 Money Management and Investments	01 Planning and using a personal budget. 02 Compare the costs of renting and buying appliances,furniture, and home entertainment equipment. 03 Compare the benefits of various investment and retirement plans. 04 Determine the costs and benefits of stocks, bonds, and mutual funds.
307 Housing and Home Improvements	01 Compare the costs of renting or buying a house or apartment. 02 Determine the down payment, monthly payment, and amount of interest paid when financing a house. 03 Determine the costs related to the purchase of a house. 04 Determine the cost of taxes, utilities, and maintenance on a house. Compute the cost of various home improvements.

308 Insurance	01 Identify various types of insurance(homeowner's, renter's, automobile, life, health, etc.)
	02 Calculate the premiums of various types of insurance.
308 Insurance	03 Compare the benefits of different insurance plans.
309 Transportation	01 Compare the cost of renting or buying new and used cars.
	02 Compare mileage and fuel costs for various automobiles.
	03 Determine the down payment, monthly payment, and amount of interest paid when financing a car purchase.
	04 Calculate the maintenence and repair costs of owning a car.
	05 Compare different means of transportation.
310 Taxes	01 Find the amount of sales tax on a purchase.
	02 Find gift, estate, and excise taxes.
	03 Find property tax.
	04 Calculate the social security tax.
	05 Find the amount of Federal Tax.
	06 Find state and local income taxes.
311 Fundamental of Economics	01 Use the Consumer Price Index to compare changing costs.
	02 Interpret the Gross National Product.
	03 Determine the rate of inflation and its effects.
312 Probability and Statistics	01 Find the mean, median, and mode of a given set of data.
	02 Interpret and construct graphs, charts, and tables.
	03 Identify and apply measures of central tendency and variability.
	04 Define the basic concepts of probability.
	05 Use probability and simulation in problem solving situations.

CAREER MATHEMATICS

C301 Introduction to Measurement Use in Vocational Fields	01 Read several kinds of industrial meters. 02 Make precise measurement of length. 03 Read and interpret technical drawings. 04 Estimate and calculate the solution to problems involving frations,decimals,and percents.
C302 Applications of Measurement	01 Add,subtract,multiply,and divide measurements in the U.S. and metric system. 03 Use a micrometer to measure length,width,or thickness to the nearest thousandth of an inch or hundredth of a millimeter. 04 Solve application problems involving measurement. Make convertions and establish equivalences within systems.
C303 Applications of Algebra	01 Write and simplify algebraic expressions. 02 Solve linear equations using addition subtraction,multiplication and division. 03 Solve algebraic equations involving powers and roots. 04 Write and use formulas from various vocational fields. 05 Use formulas and equations to solve work-related problems. 06 Use ratio and proportion to compare quantities and to read and make scale drawings. 07 Solve work-related problems involving rate, ratio, scale, and proportion.
C304 Applications of Geometry	01 Apply equation-solving skills to measurement formulas. 02 Use perimeter, circumference, area, and volume formulas to solve various industrial problems. 03 Use a protractor, compass, and straightedge to draw and measure geometric figures. 04 Use congruent and similar polygons to solve measurement problems. 05 Determine quantities of materials needed for various construction projects and estimate the cost involved.
C305 Applications of Trigonometry	01 Use the Pythagorean Theorem to solve problems involving right triangles. 02 Find the sine, cosine, and tangent ratios of acute angles. 03 Use the trigonometric ratios to solve right triangle problems.

TECH PREP AND ADMISSION TO FOUR-YEAR COLLEGES

As a Tech Prep student, you should understand what college programs you are preparing for and what your options are should you decide that you want to earn a four-year college degree.

Tech Prep prepares you to enter occupational degree programs at a two-year college, such as Tri-County Technical College. Occupational degree programs are designed to prepare graduates for the workforce, they are not intended to transfer (i.e., provide the first two years of a bachelor's degree). However, there are certain courses and certain majors within occupational degree programs that will transfer to specific four-year colleges. TO DETERMINE EXACTLY WHICH COURSES FROM AN OCCUPATIONAL DEGREE PROGRAM WILL TRANSFER, AND TO WHICH FOUR-YEAR COLLEGES, CALL THE ADMISSIONS OFFICE OR DEPARTMENT HEAD AT THE TWO-YEAR COLLEGE.

Occupational degree programs provide one to two years of college training for careers offering good pay, challenging responsibilities, and opportunities for advancement. These programs will prepare you for many careers available in our area where a four-year college degree is not necessary. And careers for two-year college graduates are increasing every year!

But, if you should decide that you prefer to earn a four-year college degree, you have two options:

1. Meet with your counselor and switch to the College Prep Program, if possible.
2. Plan to enter a university transfer program (Associate in Arts or Associate in Science) at Tri-County Technical College or another area two-year college and then transfer into a four-year college. (Note: Your advisor at the two-year college will help you decide whether or not you'll need to take prerequisite math and English courses before attempting transfer-level coursework. Transfer-level coursework is the same level as is taught at Clemson or other four-year institutions.)

University transfer programs are designed to provide you with up to the first two years of a bachelor's degree. By working closely with an academic advisor, assigned to you when you enter the two-year college, you should be able to transfer your credit successfully to any four-year college in the United States. (Your advisor will also be able to tell you which courses from occupational degree programs--like accounting, computer programming, and others--you can take in your university transfer program that will transfer to a four-year college.)

Transferring offers you many, many benefits including:

1. High quality education, small classes, personal attention.
2. Special support services like tutoring and study skills programs to help you handle successfully university-level work.
3. Up to two years of credit applicable toward a bachelor's degree at considerable savings!
4. The opportunity to be accepted to a four-year college on the basis of your two-year college transcript, often without having to take the SAT or meet a foreign language requirement for admission.

Listed below is information on the transfer admission requirements for several area colleges (as of August, 1989). Remember, each four-year college sets its own transfer admission requirements, and those requirements may change from year to year, so **BE SURE TO CHECK WITH THE FOUR-YEAR COLLEGE OF YOUR CHOICE FOR THE LATEST INFORMATION!!**

This information was approved by the transfer admissions office of each institution. If you have questions, please contact the person listed for each college.

CENTRAL WESLEYAN COLLEGE

To transfer from a university transfer program to Central Wesleyan College:

--You may have a maximum of 68 semester hours (102 quarter hours) accepted from a two-year institution.

--You must have a grade average of C or better for major or general education credit.

--You may transfer a maximum of 12 hours of D work as elective credit only.

--SAT requirement:
If you've completed 30 (transferable) semester hours of coursework in a university transfer program, NO SAT is required for transfer admission. If you have completed less than 30 semester hours, the SAT IS required for transfer admission.

--foreign language:*
NO foreign language is required for admission when you transfer from a university transfer program.

--high school transcript:
If you've completed 30 (transferable) semester hours of coursework, your high school transcript is NOT required for admission when you're transferring from a university transfer program; if you've completed less than 30 hours, your high school transcript IS required for transfer admission.

CONTACT PERSONS:
Tim Wilkerson, Dean of Enrollment Management or
Christine Walker, Senior Admissions Counselor
Central Wesleyan College
Central, South Carolina 29630-1020
(803) 639-2453 or 636-4099

* Foreign language may not be required for admission when you transfer into a four-year college, but many times foreign language is required to graduate from the four-year college. Foreign languages are offered at two-year colleges.

CLEMSON UNIVERSITY

To transfer from a university transfer program to Clemson University:

- --You must have completed at least 30 (transferable) semester hours of coursework.
- --You must have a grade average of C+ or better in university transfer courses.
- --**SAT requirement:**
  If you are transferring from a university transfer program, generally there is NO SAT score required for transfer admission. However, Clemson reserves the right to require the SAT in certain cases if two-year college coursework is borderline.
- --**foreign language requirement:***
  If you are transferring from a university transfer program, NO foreign language is required for transfer admission.
- --high school transcript:
  If you've completed 30 (transferable) semester hours of coursework in a university transfer program, your high school transcript is NOT required for transfer admission. If you've completed less than 30 (transferable) semester hours, your high school transcript IS required for transfer admission. Clemson reserves the right to require the high school transcript in special circumstances.

CONTACT PERSON:

Robert Barkley
Assistant Dean of Admissions
Clemson University
Clemson, South Carolina 29634-4024
(803) 656-2287

* Foreign language may not be required for admission when you transfer into a four-year college, but many times foreign language is required to graduate from the four-year college. Foreign languages are offered at two-year colleges.

FURMAN UNIVERSITY

To transfer from a university transfer program to Furman University:

- --You are not required to have a specific grade point average. However, collegiate GPA is very important.
- --You must have a grade of C or better on each course transferred.
- --**SAT requirement:**
  If you have completed 30 (transferable) hours of coursework, NO SAT is required for transfer admission. If you've completed less than 30 (transferable) credit hours of coursework, the SAT IS required for transfer admission.
- --**foreign language requirement:***
  There is NO foreign language requirement for transfer admission when enrolling from a university transfer program.
- --high school transcript:
  You WILL need to submit your high school transcript to Furman in order to complete transfer admission requirements.

CONTACT PERSON:

Carey Thompson
Director of Admissions
Furman University
Greenville, South Carolina 29613
(803) 294-2000

* Foreign language may not be required for admission when you transfer into a four-year college, but many times foreign language is required to graduate from the four-year college. Foreign languages are offered at two-year colleges.

LANDER COLLEGE
To transfer from a university transfer program to Lander College:

- --You may transfer a maximum of 64 semester hours (96 quarters hours).
- --You must have a grade of C or better in each transfer course.
- **--SAT requirement:**
  If you've completed 30 (transferable) semester hours in a university transfer program, NO SAT is required for transfer admission. If you've completed less than 30 semester hours of transferable credit, the SAT IS required for transfer admission.
- **--foreign language requirement:***
  If you've completed 30 (transferable) semester hours of coursework in a university transfer program, NO foreign language is required for transfer admission. If you've completed less than 30 semester hours of transferable credit, a foreign language MAY BE required for transfer admission.
- **--high school transcript:**
  If you've completed 30 semester hours of transferable coursework in a university transfer program, your high school transcript is NOT required for transfer admission. If you've completed less than 30 (transferable) credit hours, your high school transcript IS required for transfer admission. Students who wish to transfer less than 30 semester hours must meet freshmen admissions requirements as listed in the college catalog.

CONTACT PERSON:

Jacquelyn Roark
Director of Admissions
Lander College
Greenwood, South Carolina 29649
(803) 229-8307 or 1-800-768-3600

* Foreign language may not be required for admission when you transfer into a four-year college, but many times foreign language is required to graduate from the four-year college. Foreign languages are offered at two-year colleges.

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SEMESTER HOURS AND QUARTER HOURS

Technical colleges are on a quarter hour system while most universities are on a semester hour system. Thirty semester hours would equal 45 quarter hours. Most transfer courses at two-year technical colleges are worth 4.5 credit hours each. To earn 30 semester hours of coursework at a technical college, you would have to successfully complete approximately 10 transfer-level courses.

To convert semester hours to quarter hours:

# of semester hours X 1.5 = quarter hours

To convert quarter hours to semester hours:

# of quarter hours X .67 = semester hours

NOTE: Beginning in the summer and fall of 1992, the technical colleges in South Carolina will change to the semester system. With this change, technical colleges and four-year colleges and universities in South Carolina will be granting college credit within the semester system.

TRI-COUNTY TECHNICAL COLLEGE

OCCUPATIONAL DEGREE PROGRAMS AND UNIVERSITY TRANSFER PROGRAMS

Occupational Degree Programs

Accounting
Automated Manufacturing Technology
Child Development Assistant*
Computer Technology (Data Processing and Computer Programming emphases)
Criminal Justice Technology
Dental Assisting*
Electronics Engineering Technology
Engineering Graphics Technology
Fashion Merchandising*
General Technology (majors: Industrial Mechanics, Welding)
Heating, Ventilation, Air Conditioning Technology
Industrial Electronics Technology
Industrial Mechanics*
Machine Tool Technology
Management (General, Marketing, Financial Management emphases)
Medical Laboratory Technology
Nursing (Associate Degree/Registered Nurse)
Practical Nursing (LPN)*
Quality Assurance Technology
Radio and Television Broadcasting
Secretarial Science/Office Systems Technology
Surgical Technology*
Textile Management Technology
Veterinary Technology
Welding*

University Transfer Programs

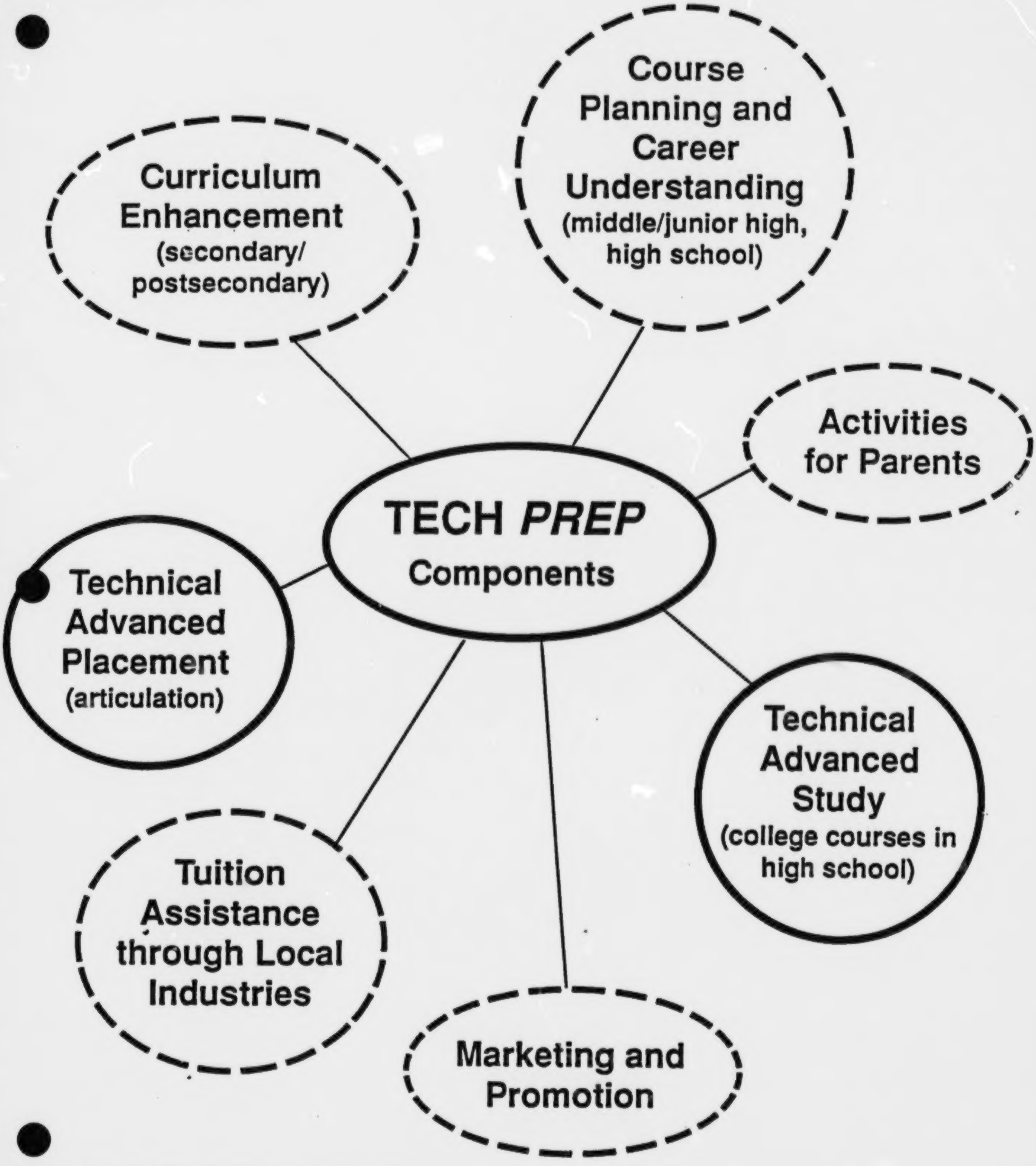
Associate in Arts
Associate in Science

* Indicates one-year certificate or diploma programs. (Secretarial Science/Office Systems Technology also offers diploma and certificate options.) All other programs on this list are associate degree programs. (Tri-County Technical College also offers a number of short-term certificate programs for job training that are not included on this list--contact the College admissions office for more information on certificate programs.)

(August, 1990)

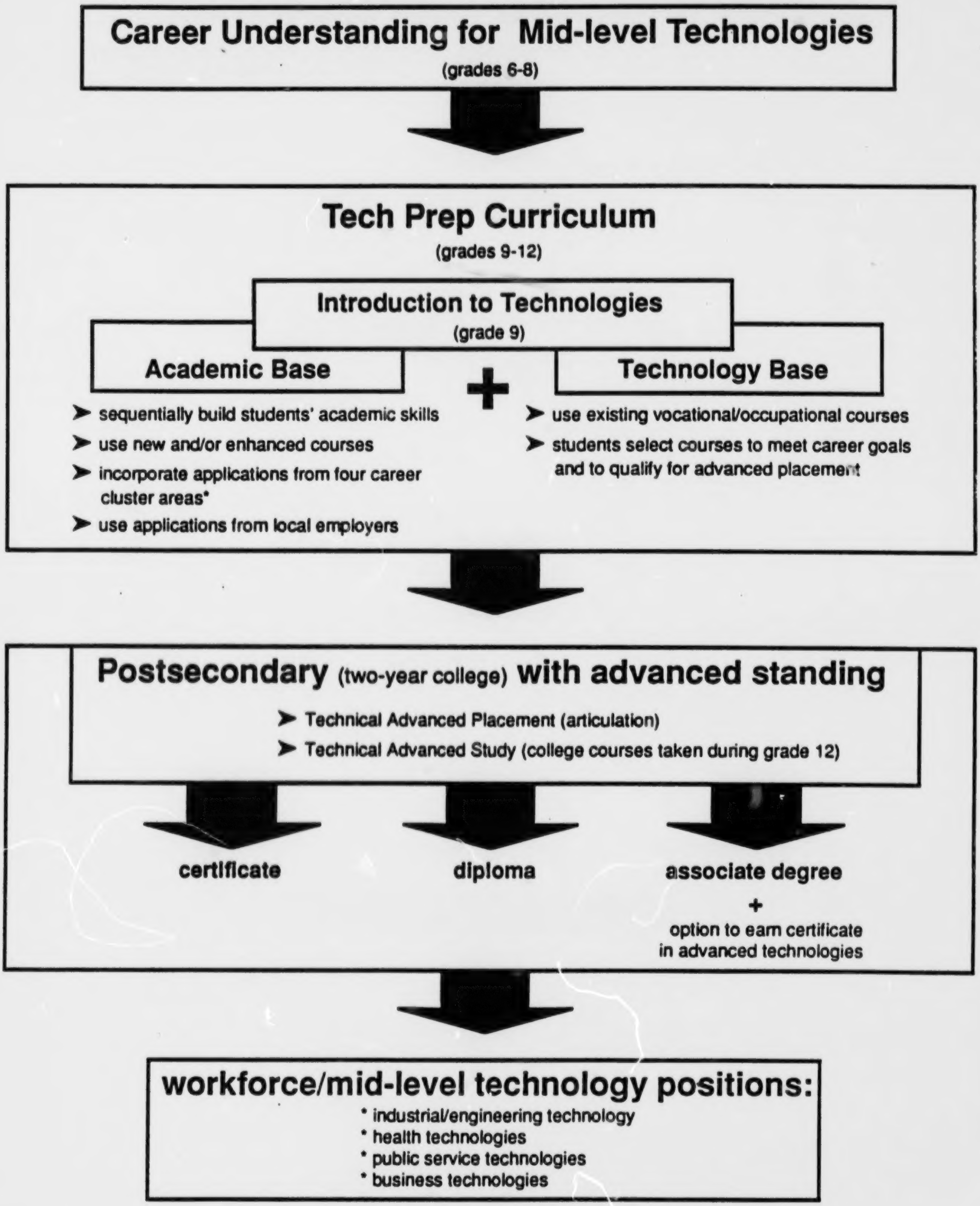
Partnership for Academic and Career Education
P.O. Box 587
Pendleton, SC 29670

APPENDIX C


TECH *PREP*
Components
Curriculum Enhancement (secondary/ postsecondary)
Course Planning and Career Understanding (middle/junior high, high school)
Activities for Parents
Technical Advanced Placement (articulation)
Technical Advanced Study (college courses in high school)
Tuition Assistance through Local Industries
Marketing and Promotion

(Dotted lines indicate areas where business/industry involvement occurs.)

P.A.C.E. MODEL FOR TECH PREP



Career Understanding for Mid-level Technologies

(grades 6-8)

Tech Prep Curriculum

(grades 9-12)

Introduction to Technologies

(grade 9)

Academic Base + **Technology Base**

Academic Base:

- ➤ sequentially build students' academic skills
- ➤ use new and/or enhanced courses
- ➤ incorporate applications from four career cluster areas*
- ➤ use applications from local employers

Technology Base:

- ➤ use existing vocational/occupational courses
- ➤ students select courses to meet career goals and to qualify for advanced placement

Postsecondary (two-year college) **with advanced standing**

- ➤ Technical Advanced Placement (articulation)
- ➤ Technical Advanced Study (college courses taken during grade 12)

certificate

diploma

associate degree

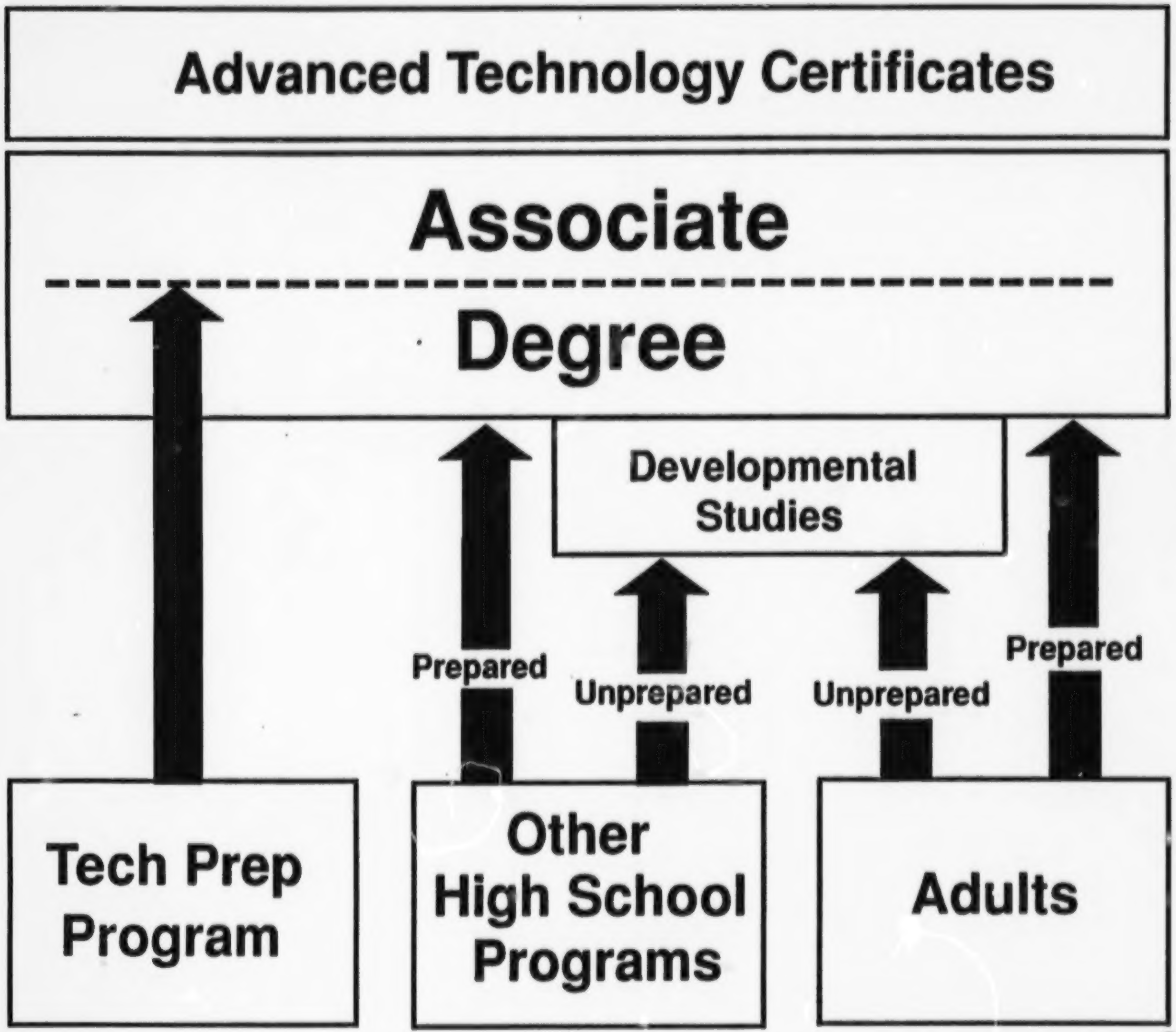
+

option to earn certificate in advanced technologies

workforce/mid-level technology positions:

* industrial/engineering technology
* health technologies
* public service technologies
* business technologies

PACE MODEL: Methods of Entry



Advanced Technology Certificates

Associate

Degree

Developmental Studies

Prepared

Unprepared

Unprepared

Prepared

Tech Prep Program

Other High School Programs

Adults

P.A.C.E. Model for Tech Prep

- Concept is flexible and can be adapted to meet needs, interests, resources of individual districts, regardless of district/school size.

- More cost-effective to develop/implement than other models—however, costs exist in terms of course materials, faculty time for curriculum development, faculty/staff training, promotion.

- Can offer districts the opportunity to reduce "tracking" and to improve focus of programs by offering two curriculum options: College Prep (baccalaureate-bound or transfer-bound) and Tech Prep (two-year college-bound for career degrees or workforce).

  Students who complete Tech Prep and then decide to pursue a bachelor's degree can enter a University Transfer program in a two-year college (with less need for remediation than from the previous general "track" option) and transfer into a four-year degree program.

- May reach as much as 60% of high school population (students currently enrolled in vocational/ general education programs).

- Middle school/junior high component provides "frame of reference" for curriculum option in high school.

- Applied academics start in grade 9—provides continuity in instructional approach and develops career understanding as part of academic courses, helps promote district/school vocational offerings.

- Mission of vocational education remains skills-preparation but is expanded (and promoted) to include preparation for postsecondary study.

- Advanced placement (with credit) is available for all postsecondary programs in vocational and academic subjects.

- Students will have option to graduate with 2 credentials in the time it would normally take to finish an associate degree (initially for programs with time-shortened articulation)—or students may graduate with 2 credentials in 1-2 quarters beyond normal associate degree.

- Current vocational programs are not put "at odds" with Tech Prep—the program will increase vocational enrollment and will result in students entering vocational courses with stronger academic skills.

- Sets stage for curriculum enhancement in vocational areas (students can learn more, faster when they enter with stronger academic skills).

- Provides incentives for students to achieve academically, stay in school, and to pursue postsecondary education through:

  —hands-on, applied academics

  —more motivation to learn academic concepts by providing greater relevancy to "real world" (and when students are more motivated to learn, teachers are more motivated to teach)

  —greater involvement in skills-based vocational courses

  —advanced placement and/or Technical Advanced Study

  —availability of co-op, industry-sponsored tuition/employment programs

  —opportunities to graduate early from college, carry lighter course loads in beginning terms, and/or to graduate with two postsecondary credentials and advanced skills

(May, 1990)

SUMMARY OF NEW AND/OR ENHANCED TECH PREP COURSES (1987-92)

ANDERSON DISTRICT ONE

Palmetto High School
- Principles of Technology I (implemented 1990-91)
- Applied Communications III (implement 1991-92)
- Applied Communications IV (implement 1991-92)
- Mathematics for Technologies I (implement 1991-92)

Wren High School
- Principles of Technology I (implement 1991-92)
- Applied Communications III (implement 1991-92)
- Applied Communications IV (implement 1991-92)
- Mathematics for Technologies I (implement 1991-92)

THE CAREER CENTER/ANDERSON DISTRICTS ONE AND TWO
- Applied Communication IV (implemented 1990-91)

ANDERSON DISTRICT TWO

Belton-Honea Path High School
- Principles of Technology I (implement 1991-92)
- Applied Communications III (implement 1991-92)
- Applied Communications IV (implement 1991-92)
- Mathematics for Technologies I (implement 1991-92)

THE CAREER CENTER/ANDERSON DISTRICTS ONE AND TWO
- Applied Communication IV (implemented 1990-91)

ANDERSON DISTRICT THREE

Crescent High School
- Principles of Technology I (implemented 1987-88)
- Tech Prep English III (implemented 1990-91)
- Tech Prep English IV (implemented 1990-91)
- Mathematics for Technologies I (implemented 1989-90)
- Mathematics for Technologies II (implemented 1989-90)
- Tech Prep Biology (implemented 1990-91)
- Tech Prep Physical Science (implemented 1990-91)

ANDERSON DISTRICT FOUR

Pendleton High School
- Principles of Technology I (implemented 1989-90)
- Tech Prep English I (implemented 1989-90)
- Tech Prep English II (implemented 1989-90)
- Tech Prep English III (implemented 1989-90)
- Tech Prep English IV (implemented 1989-90)
- Tech Prep Math I (implemented 1990-91)
- Tech Prep Math II (implemented 1990-91)
- Tech Prep Math III (implemented 1989-90)

ANDERSON DISTRICT FIVE

McDuffie High School
- Principles of Technology I (implemented 1988-89)
- Principles of Technology II (implemented 1989-90)

Applied Communications IV (implemented 1990-91)
Vocational Math (implemented 1989-90)

Westside High School
- Applied Communications IV (implemented 1990-91)
- Vocational Math (implemented 1989-90)

T.L. Hanna High School
- Vocational Math (implemented 1989-90)

OCONEE COUNTY

Seneca High School
- Principles of Technology I (implemented 1987-88)
- Principles of Technology II (implemented 1990-91)
- Applied Communications III (implemented 1990-91)
- Applied Communications IV (implemented 1989-90)
- Mathematics for Technologies I (implemented 1989-90)

Tamassee-Salem High School
- Principles of Technology I (implemented 1989-90)
- Applied Communications III (implemented 1990-91)
- Applied Communications IV (implemented 1989-90)
- Mathematics for Technologies I (implemented 1989-90)

Walhalla High School
- Principles of Technology I (implemented 1989-90)
- Applied Communications III (implemented 1990-91)
- Applied Communications IV (implemented 1989-90)
- Mathematics for Technologies I (implemented 1989-90)

West-Oak High School
- Principles of Technology I (implemented 1988-90)
- Applied Communications III (implemented 1990-91)
- Applied Communications IV (implemented 1989-90)
- Math for Technologies I (implemented 1989-90)
- Applied Biology/Chemistry (pilot tested 1989-91)

PICKENS COUNTY

Daniel High School
- Principles of Technology I (implement 1991-92)

Liberty High School
- Principles of Technology I (implemented 1989-90)
- Math Applications for Technologies I (implement 1991-92)
- Math Applications for Technologies II (implement 1991-92)
- Math Applications for Technologies III (implement 1991-92)

B.J. Skelton Career Center (enables access from all Pickens County High Schools)
- Principles of Technology I (implemented 1990-91)
- Math Applications for Technologies III (implement 1991-92)
- Applied Vocational Mathematics (implemented 1990-91)

APPENDIX E

TECH PREP
PREPARATION FOR TECHNOLOGIES

Curriculum

Competencies for Engish, Math, and Science

Partnership for Academic and Career Education
P. O. Box 587
Pendleton, SC 29670 (803) 646-8361, Ext. 2107

Activities of the Partnership for Academic and Career Education are supported primarily by funds awarded through the U.S. Department of Education, Fund for the Improvement of Postsecondary Education (FIPSE) and the S.C. Department of Education/Office of Vocational Education's Carl Perkins Sex Equity Program. However, the opinions and information presented in this material do not necessarily reflect the positions or policies of these entities, and no official endorsement by them should be inferred.

INTRODUCTION

Technological advances have impacted on our society at a rate that defies all prediction. As the knowledge base continues its rapid growth and the number of traditional jobs shrinks, new jobs will demand new basic skills including problem solving, critical thinking, effective communication and teamworking abilities.

The Tech Prep program is a four-year continuous curriculum beginning in grade nine and continuing through grade twelve. The fundamental purpose of the program is to provide a realistic framework within which students who choose neither vocational education or a college preparatory program will gain the skills needed to be successful after high school, be it on the job or in further educational training.

The Tech Prep curriculum is designed as a viable, challenging curriculum to provide students with the skills needed to be successful in the ever-changing work environment. The Tech Prep curriculum builds academic skills through applied settings. Students who see the relationship between what is taught in the classroom and what occurs in the real-life settings will take their studies more seriously and even take courses which challenge them as learners.

TECH PREP BIOLOGY

Tech Prep Biology is designed for students who will pursue postsecondary educational opportunities at a two-year college. The course will provide a foundation in the biological sciences. Content areas include the chemistry of life, cell structure and function, classification of organisms, genetics, systems of the human body, and the plant kingdom. Classroom discussions and laboratory investigations are integral parts of the course.

Laboratory experiences will center around use of the scientific method of experimentation. Lab reports will require complete documentation of procedures and data. Written lab reports will also be an integral part of this course.

COURSE OBJECTIVES

1. Students will explain and use the scientific method in problem solving and laboratory settings.
2. Students will use the correct format when writing laboratory reports.
3. Students will define and explain the composition, structure, and properties of living and non-living materials.
4. Students will identify and describe the nutrients which give life to organisms.
5. Students will demonstrate a knowledge of the light microscope and explain the significance of the microscope in the study of life.
6. Students will identify the components of cells and explain the function of each component.
7. Students will explain the process of photosynthesis.
8. Students will identify and explain the processes which produce the energy required to support life.
9. Students will explain the structure and function of DNA.
10. Students will discuss cellular reproduction.
11. Students will explain Mendel's principles of inheritance and how these principles affect inherited characteristics.
12. Students will describe the process of scientific classification.
13. Students will describe processes which enable organisms to change over time.

14. Students will explain the diversity of organisms belonging to various kingdoms.

15. Students will explain the function and composition of various kinds of animal tissues.

16. Students will identify the various systems in animal organisms.

17. Students will identify and explain the function of the various systems within the human body.

18. Students will identify various plant tissues.

19. Students will explain the function of plant tissues.

20. Students will compare and contrast various root systems.

21. Students will compare and contrast stems of various plants.

22. Students will compare and contrast the differing leaf structures of plants.

23. Students will discuss nutrients required for plant growth.

24. Students will compare and contrast the systems of transportation within plants.

25. Students will discuss the relationship between organisms and their environments.

STUDENT OBJECTIVES

The student will be able to:

- I. SCIENTIFIC INVESTIGATION
  - A. Scientific Method
    1. list and explain the steps of the scientific method.
    2. explain the significance of "control" in an investigation.
    3. state "if...then" hypothesis for a problem.
    4. conduct a controlled experiment to test an "if...then" hypothesis.
    5. summarize, in written form, the controlled experiment and results.
  - B. Use of the Microscope
    1. identify the parts of a light microscope.
    2. discuss the significance of the parts of the light microscope.
    3. list the steps for correctly using the microscope.
    4. prepare slides and observe the mounted material.
    5. discuss the use of staining solutions in observing mounted materials.
    6. describe the use of electron, dissecting, and phase contrast microscopes in the study of materials.

- II. COMPOSITION OF LIFE
  - A. Matter
    1. define matter.
    2. list and describe the states of matter.
    3. compare and contrast physical and chemical change.
    4. compare and contrast living and non-living matter.
  - B. Atomic Make-up
    1. define atom and element.
    2. compare and contrast atoms and elements.
    3. describe the properties of protons, electrons, and neutrons.
    4. diagram various elements to show subatomic structure.
    5. define isotope.
    6. compare and contrast isotopes of the same element.
  - C. Bonding
    1. explain the foundation for the chemical activity of an atom.
    2. explain why certain elements gain or lose electrons during the bonding process.
    3. define ion.
    4. compare and contrast anions and cations.
    5. compare and contrast different types of bonding.
    6. explain the significance of ions in biological systems.
    7. define chemical reaction and give an example of a chemical reaction.
    8. list and describe factors which affect the rate of a chemical reaction.

- D. Compounds and mixtures
  1. define molecule, compound, and mixture.
  2. compare and contrast molecules and compounds.
  3. compare and contrast mixtures and compounds.
  4. list and define the parts of a solution.
  5. distinguish among solutions, suspensions, and colloids.
- E. pH
  1. define pH.
  2. define acid and base.
  3. determine the pH of a solution.
  4. classify a solution as acidic, basic, or neutral.

III. MOLECULAR BIOLOGY

- A. Organic and Inorganic Compounds
  1. compare and contrast organic and inorganic compounds.
  2. identify six elements found in macromolecules.
  3. identify four major groups of macromolecules.
- B. Carbohydrates
  1. discuss the chemical composition of carbohydrates.
  2. classify carbohydrates according to their structure.
  3. explain uses of carbohydrates as a fuel for cellular activity.
  4. explain the function of various carbohydrates.
  5. identify and describe at least two tests which can be used to determine the presence of carbohydrates.
  6. define condensation (dehydration-synthesis) and hydrolysis.
  7. apply condensation (dehydration-synthesis) and hydrolysis to the production and/or breakdown of carbohydrates.
- C. Lipids
  1. describe the chemical structure of lipids.
  2. describe the composition of fat.
  3. distinguish among saturated, unsaturated, and polyunsaturated fats.
  4. identify various sources of fats.
  5. apply condensation (dehydration-synthesis) and hydrolysis to the composition and/or decomposition of fats.
  6. identify ways of testing for the presence of fats.
- D. Proteins
  1. describe the chemical structure of proteins.
  2. identify three functions of proteins.
  3. identify ways of testing for the presence of proteins.
  4. describe the denaturing process.
- E. Enzymes
  1. define enzyme.
  2. define catalyst.
  3. explain the role of enzymes in increasing reaction time.
- F. Energy
  1. state and explain the first and second laws of thermodynamics.
  2. define entropy.
  3. distinguish among kinetic energy, potential energy, radiant energy, and chemical energy.
  4. define ATP.
  5. explain the significance of ATP.

IV. CELLS

A. Organization

1. describe the concept of cell theory.
2. discuss the contribution of scientists to cell theory.
3. compare cell surface and cell volume and relate them to multicellular organisms.
4. compare and contrast prokaryotic and eukaryotic cells.

B. Walls and Membranes

1. describe the composition of cell walls.
2. identify organisms which have cell walls.
3. identify several functions of cell walls.
4. identify components of cell membranes.
5. identify 2 functions of cell membranes.

C. Subcellular structures

1. identify various parts of a cell.
2. describe the structure and function of membranous organelles.
3. describe the structure and function of non-membranous organelles.
4. identify subcellular structures found in plants and animals.
5. compare and contrast plant and animal cells.

D. Structural levels

1. describe the relationship among cells, tissues, organs, and systems.

E. Permeability

1. state and explain the Law of Diffusion
2. describe selective permeability
3. define osmosis.
4. explain the relationship among diffusion, osmosis, and living cells.
5. demonstrate diffusion and osmosis.
6. define homeostasis.

V. PHOTOSYNTHESIS

A. Process

1. compare and contrast autotroph and heterotroph.
2. give a general description of the process of photosynthesis.
3. write a chemical equation which summarizes photosynthesis
4. identify the raw materials and end products of photosynthesis.

B. The Role of Chlorophyll

1. explain the role of chlorophyll in photosynthesis.
2. explain why green plants appear green.
3. identify the various pigments found in green leaves.
4. identify two factors which affect coloration.

C. Reactions

1. compare and contrast light-dependent (light) and light-independent (dark) reactions.
2. identify the source of carbon, hydrogen, and oxygen in sugar molecules.
3. give the sequence of the various events which occur during photosynthesis.

VI. CELLULAR RESPIRATION
- A. Overview
  1. compare and contrast cellular respiration and breathing.
  2. describe the process of cellular respiration.
  3. write a chemical equation which summarizes respiration.
  4. compare and contrast cellular respiration and photosynthesis equations.
- B. Fermentation
  1. define fermentation.
  2. explain fermentation as an anaerobic process.
  3. compare and contrast the fermenting process of yeast cells and muscle cells.

VII. GENETICS
- A. Basis
  1. compare and contrast DNA and RNA.
  2. list the functions of DNA and RNA.
  3. describe the chemical structure of DNA.
  4. describe the production of DNA and RNA.
  5. compare and contrast pyrimidine and purine nitrogen bases.
  6. compare and contrast ribose and deoxyribose.
  7. define nucleotide
  8. explain the Watson-Crick model of DNA.
  9. explain the replication of DNA.
- B. Mutation
  1. define mutation.
  2. describe the affect of mutation on DNA.
  3. define point and frame shift mutation.
  4. explain sickle cell anemia as a result of mutation.

VIII. REPRODUCTION OF CELLS
- A. Chromosomal Structure
  1. explain the relationship of DNA to chromosomes.
  2. define centromere.
- B. Mitosis
  1. identify the importance of mitosis.
  2. describe the difference between haploid and diploid number.
  3. list and describe the phases of mitosis.
  4. describe the chromosomal behavior during each phase of mitosis.
  5. explain mitosis as a division process.
  6. compare and contrast cell division in plants and animals.

C. Meiosis
   1. identify the importance of meiosis.
   2. explain meiosis as a reduction process.
   3. compare and contrast mitosis and meiosis.
   4. illustrate and describe the generalized sexual life cycle.
   5. define sporophyte and gametophyte.
   6. define
      a. gamete   c. spore   e. haploid
      b. zygote   d. fertilization   f. diploid
   7. discuss the role of sexual reproduction in genetic variability.

IX. GENETICS
   A. Mendelian Genetics
      1. describe Gregor Mendel's experiments.
      2. explain the principles of dominance and segregation.
      3. define genotype and phenotype.
      4. define homozygous and heterozygous.
      5. analyze monohybrid crosses.
      6. give genotypic and phenotypic ratios for monohybrid crosses.
      7. define F1 and F2 generations.
      8. solve problems involving combinations of genetic principles.
   B. Variation
      1. define mass selection.
      2. give examples of mass selection.
      3. define inbreeding and hybridization.
      4. analyze problems associated with inbreeding and hybridization.
      5. define polyploidy.
      6. cite examples of polyploidy in plants and animals.
   C. Inheritance
      1. state the chromosomal theory of inheritance.
      2. cite evidence that genes are on chromosomes.
      3. define autosome and sex chromosome.
      4. explain the XY sex determination principle.
      5. apply the XY sex determination principle to humans.
   D. Chromosomal-Linked Diseases
      1. list and describe three syndromes which result from chromosomal abnormalities.
      2. describe how chromosomal abnormalities can be caused by additions, deletions, translocations, and inversions.
      3. explain the concept of non-disjunction.

X. EVOLUTION
    1. explain two fundamental concepts of modern evolutionary theory.
    2. explain the relationship among phenotype, genetic variation, and evolutionary change.
    3. analyze Lamarck's hypothesis of inheritance of acquired characteristics.
    4. explain Darwin's theory of evolution.
    5. explain natural selection.
    6. cite examples of evidence which support Darwin's evolutionary theory.

XI. TAXONOMY
  A. Early Systems
    1. define taxonomy.
    2. describe early methods of classification.
    3. describe the basis of classification systems.
  B. Linneaus
    1. describe Linneaus' contributions to modern classification.
    2. explain the binomial nomenclature system.
    3. write the Latin binomial correctly.
    4. define species.
    5. compare and contrast species and genus.
  C. Taxonomical Groups
    1. arrange, in order, the seven main hierarchical levels.
    2. classify organisms according to the hierarchical levels.
    3. compare a two kingdom system to a three, four, and/or five kingdom system.
    4. compare and contrast organisms in the five major kingdoms.

XII. Kingdom MONERA
  A. Viruses
    1. compare and contrast viruses and cells.
    2. identify four diseases caused by viruses.
    3. explain why viruses may be classified as non-living.
    4. explain the replication process used by viruses.
  B. Bacteria and Blue-green Algae
    1. recall the differences between prokaryotic and eukaryotic cells.
    2. identify distinguishing characteristics of bacteria and blue-green algae.
    3. give the shapes of bacteria along with the Latin name.
    4. summarize Pasteur's contributions to microbiology.
    5. describe the reproduction process of bacteria.
    6. identify benefits and harms of bacteria to man.

XIII. Kingdom PROTISTA
    1. recognize **Amoeba, Euglena** and **Paramecium.**
    2. identify the parts of each organism.
    3. describe the function of the parts of each organism.
    4. discuss the role of phagocytosis and pinocytosis in protists.

XIV. Kingdom FUNGI

1. identify general characteristics of fungi.
2. identify hypha, mycelium, and spore.
3. explain why fungi are classified as heterotrophs.
4. explain the saprotrophic mode of nutrition.
5. compare and contrast fungi with the Kingdom PLANTAE.
6. list ways fungi are both beneficial and harmful to man.
7. identify components of a lichen.
8. relate symbiosis to lichens.
9. identify several types of lichens

XV. Kingdom PLANTAE

A. Algae
   1. compare and contrast unicellular and multicellular algae.
   2. identify the three major divisions of algae.
   3. describe the habitat of each division of algae.
   4. identify the distinguishing characteristics of each division of algae.
   5. analyze the economic importance of algae.
   6. identify holdfast, stipe, and thallus.

B. Bryophyta
   1. identify the characteristics of mosses.
   2. describe the habitat of mosses.
   3. describe the economic importance of mosses.

C. Tracheophyta
   1. define vascular tissue.
   2. distinguish among ferns, mosses, and horsetails.
   3. explain the life cycle of a fern.
   4. discuss alternation of generations in ferns.
   5. relate the life cycle of the fern to the structure of a sorus and prothallus.
   6. describe the distinguishing characteristics of gymnosperms.
   7. define seed, cone and pollen and relate each to gymnosperms.
   8. identify various types of conifers by leaves and cones.
   9. identify the distinguishing characteristics of angiosperms.
   10. compare and contrast monocots and dicots.
   11. identify the parts of a flower.
   12. describe the function of each part of the flower.
   13. describe the life cycle of an angiosperm.
   14. identify endosperm by giving its function.
   15. distinguish among simple, multiple, and aggregate fruits.
   16. distinguish among pome, berry, and drupe.
   17. describe the pollination process in angiosperms.

XVI. Kingdom ANIMALIA

A. Classification
   1. list the 10 major animal phyla.
   2. identify organisms in each of the major phyla.

B. Porifera
   1. describe the structure of a sponge.
   2. analyze sponges as an example of cellular level of development.

C. Cnidaria

   1. describe the general structure of **Cnidaria**.
   2. describe the two variations of the body structure of **Cnidaria**.
   3. explain the process by which **Cnidaria** capture food.

D. Platyhelminthes

   1. describe the general structure of **Platyhelminthes**.
   2. identify the three classes of **Platyhelminthes**.
   3. identify symptoms of a human infected with **Platyhelminthes**.

E. Aschelminthes

   1. describe the general structure of **Aschelminthes**.
   2. identify the distinguishing characteristics of **Aschelminthes**.
   3. identify three classes of **Aschelminthes**.
   4. list benefits and harms of **Aschelminthes**.
   5. draw and explain the life cycle of various **Aschelminthes**.

F. Annelida

   1. describe the general structure of annelids
   2. explain the various systems of annelids.
   3. identify common annelids.

G. Mollusca

   1. describe the general structure of mollusks.
   2. describe the various systems within mollusks.
   3. explain why mollusks are classified as segmented animals.

H. Anthropoda

   1. list five general characteristics of arthropods.
   2. compare and contrast arthropods and annelids.
   3. explain the pros and cons of an exoskeleton.
   4. explain the necessity of molting in arthropods.
   5. describe the general structure of arthropods.
   6. identify describe the systems within arthropods.
   7. compare and contrast the life cycles of various insects.
   8. describe the social organization and behaviors of certain insects.
   9. identify at least seven examples of insects.

I. Echinodermata

   1. describe the general structure of echinoderms.
   2. explain bilateral symmetry and radial symmetry.

J. Chordata
   1. identify the general characteristics of chordates.
   2. list the modern classes of vertebrates.
   3. describe the major organ systems of vertebrates.
   4. list three characteristics of fish.
   5. compare and contrast various types of fish.
   6. list three characteristics of amphibians.
   7. dissect a frog to study anatomy and physiology.
   8. list three characteristics of reptiles.
   9. identify an example of each major order of reptiles.
   10. list three characteristics of birds.
   11. explain adaptation in birds for flight.
   12. identify examples of modern birds.
   13. list three general characteristics of mammals.
   14. compare and contrast monotremes, marsupials, and placental mammals.
   15. identify an example of each order of mammals.
   16. compare and contrast the structural adaptations of mammals and other vertebrates.
   17. define homeothermy and compare it with poikilotherm.
   18. cite structural and behavioral advancements which distinguish humans from other mammals.

XVII. ANIMAL TISSUE
   A. Epithelial
      1. describe the function of epithelial tissue.
      2. identify locations of epithelial tissue.
   B. Connective
      1. describe the function of connective tissue.
      2. identify types of connective tissue.
      3. compare and contrast compact and spongy bone.
      4. describe the chemical make-up of bone.
      5. define endochondral replacement bone.
      6. describe the physical nature of cartilage.
      7. compare and contrast bone and cartilage.
      8. compare and contrast loose and connective tissue.
      9. describe the cellular components of blood.
      10. explain the functions of erythrocytes, leukocytes, and platelets.
   C. Muscles
      1. distinguish among skeletal, cardiac, and smooth muscle.
      2. give the location of skeletal, cardiac, and smooth muscles.
   D. Nervous
      1. identify the various parts of a motor neuron.
      2. state the function of each part of a nerve cell.

XVIII. DIGESTION

A. Nutrition
   1. compare and contrast autotroph and heterotroph.
   2. distinguish among saprotrophic, holotrophic and parasitic modes of nutrition.
   3. compare and contrast intracellular and extracellular digestion.
   4. explain the role of fats, vitamins, protein, and minerals in animals.

B. Vertebrates
   1. draw and label generalized vertebrate gut.
   2. list, in order, the structures of the human digestive tract.
   3. explain peristalsis.
   4. explain the function of villi in the digestive process.
   5. explain the function of the liver, pancreas, and gall bladder in the digestive process.
   6. explain how food is prevented from being sent down the trachea during swallowing.
   7. define caecum and appendix.
   8. discuss the role of the large intestine in water resorption.

XIX. RESPIRATION

A. Invertebrates
   1. cite examples of invertebrates which use body surface for gas exchange.

B. Vertebrates
   1. list the general characteristics of gills and how they are used in the respiratory process.
   2. cite examples of organisms which use gills.
   3. describe the general characteristics of lungs.
   4. discuss the relationship between the lungs and the circulatory system.
   5. draw and label the human respiratory system.
   6. describe the function of each part of the human respiratory system.
   7. explain the process of diffusion.
   8. compare and contrast inhalation and exhalation.

XX. CIRCULATION

A. Open and Closed Circulatory Systems
   1. discuss the role of diffusion in the distribution of molecules throughout a cell.
   2. describe an open circulatory system.
   3. cite example of animals without internal circulatory systems.
   4. describe a closed circulatory system.
   5. compare and contrast an open and closed circulatory system.
   6. cite examples of invertebrates with closed circulatory systems.
   7. define artery, vein, and capillary.
   8. explain the function of artery, vein, and capillary.

B. Human Circulatory System
   1. identify and explain the function of the various parts of the human heart.
   2. explain the terms systolic and diastolic.
   3. explain the role of capillaries in exchange of molecules between the blood and tissue.

C. Lymphatic System
   1. compare and contrast the lymphatic system with the blood circulatory system.
   2. cite three functions of the lymphatic system.
   3. describe the various lymphoid organs in the body.

D. Immune System
   1. describe the events in the inflammatory response.
   2. identify the parts of the immune system.
   3. compare and contrast humoral and tissue immunity.
   4. compare and contrast antibody and antigen.
   5. define lymphocyte.
   6. describe the function of lymphocytes.

XXI. EQUILIBRIUM IN ANIMALS

A. Thermoregulation
   1. compare and contrast ectothermy and endothermy.
   2. define behavioral thermoregulation.
   3. define basal metabolic rate.

B. Human Kidney
   1. describe the gross structure of the human kidney.
   2. describe the function of the human kidney.

XXII. SUPPORT AND LOCOMOTION IN HUMANS

A. Skeletal System
   1. describe the structure and function of bone.
   2. list three types of connective tissue in the human support system.
   3. identify the major bones of the axial and appendicular skeleton.
   4. list the types of joints in the human skeletal system and give an example of each.

B. Muscular System
  1. describe the function of ligaments and tendons.
  2. cite locations of ligaments and tendons.
  3. define origin and insertion.
  4. compare and contrast flexors and extensors.
  5. compare and contrast the three types of vertebrate muscles.

XXIII. NERVOUS SYSTEM
A. Introduction
  1. compare and contrast a neuron and a nerve.
  2. define ganglion.
  3. identify which part of the neuron is located in gray matter and which part is located in white matter.
  4. describe the process of myelination.
B. Nervous System
  1. identify the parts of the central nervous system.
  2. identify the regions of the human brain.
  3. describe the function of each region of the human brain.
  4. analyze the structure of the spinal cord.
  5. describe the components of the peripheral nervous system.
C. Senses
  1. distinguish between sensation and perception.
  2. describe the general features of a receptor.
  3. describe the function of sensory receptors.
  4. analyze the structure of the vertebrate eye.
  5. describe the structure of the human ear.

XXIV. ENDOCRINE SYSTEM
A. Hormones
  1. define hormone.
  2. describe the regulation of metabolism, reproduction, and development by hormones.
B. Human Body
  1. name the human endocrine glands.
  2. state the location of the human endocrine glands.
  3. list the major hormone produced by each endocrine gland.
  4. describe the function of each hormone.
  5. describe the resulting condition of a deficiency or excess of each hormone.
  6. discuss the role of insulin and glucagon in maintaining proper blood sugar levels.
  7. discuss the role of the hypothalamus as the master gland.

XXV. REPRODUCTION

A. Human Reproductive Systems
  1. label a diagram of the human male reproductive system.
  2. trace the path of the sperm from the testes to the outside of the body.
  3. name the primary male sex hormone and tell where it is produced.
  4. distinguish between ureter and urethra.
  5. label a diagram of the human female reproductive system.
  6. name the primary female sex hormone and tell where it is produced.
  7. describe the process of ovulation.
  8. describe the menstrual cycle.
  9. describe the process of fertilization.
  10. describe the process of hormonal maintenance during pregnancy.

B. Fetal Development
  1. describe the function of the human placenta.
  2. describe the process of gas and waste transfer from the fetus to the mother and the mother to the fetus.
  3. describe the fetal changes occurring each month during fetal development.

XXVI. PLANT TISSUE

A. Primary Tissues
  1. list the three areas in a plant where growth occurs.
  2. give the location and two functions of the epidermis.
  3. describe the function of the cuticle.
  4. give the location of the cuticle.
  5. sketch and identify the parts of a stoma.
  6. describe the function of epidermal stomata.
  7. describe the function of stomatal guard cells.
  8. compare and contrast epidermal and guard cells.
  9. describe the importance of root hairs.
  10. compare and contrast xylem and phloem.

B. Secondary Tissues
  1. locate the vascular cambium.
  2. explain the function of vascular cambium.
  3. distinguish between summerwood and springwood.
  4. explain the importance of annual rings to tree life.

XXVII. PLANT COMPONENTS

A. Roots
  1. distinguish among primary, secondary, and adventitious root.
  2. compare and contrast taproot and fibrous root system.

B. Stem
  1. cite three important functions of stems.
  2. distinguish between herbaceous and woody plants.
  3. distinguish among annuals, perennials, and biennials.

C. Leaf
   1. explain the major function of leaves.
   2. compare and contrast simple and compound leaves.
   3. compare and contrast pinnate and palmate venation.
   4. distinguish among opposite, alternate, and whorled leaf attachments.
   5. identify anatomical adaptations of leaves to conserve water loss by transpiration.
   6. define leaf abscission.

XXVIII. PLANTS
   A. Nutrition
      1. distinguish between autotrophs and saprophytes.
      2. explain how plants procure and utilize carbon dioxide and water.
      3. describe the procurement and transportation of minerals.
      4. list the three classes of nutrients required by plants.
      5. compare and contrast macronutrients and micronutrients.
   B. Transport
      1. explain the principle of diffusion and capillary action.
      2. explain the function of xylem in transportation.
      3. explain the function of phloem in transportation.
      4. define transpiration.
   C. Gas Exchange
      1. describe two ways roots can absorb oxygen.
      2. explain the process of soil aeration.
      3. explain the consequences of improper soil aeration.
      4. describe the function of stomata in gas exchange.
   D. Hormone
      1. define hormone.
      2. list five hormones found in plants and indicate if each hormone acts as an inhibitor or a stimulator.
      3. describe the affect of hormones on roots, buds, stems, and fruits.

XXIX. ECOLOGY
   A. Population Interactions
      1. draw and label examples of food chains, food webs, and nutrient cycles.
      2. explain food chains, food webs, and nutrient cycles.
      3. define producers, consumers, and decomposers.
      4. define "symbiosis".
      5. distinguish among commensalism, mutualism, parasitism, and competition.
      6. explain the concept of predator-prey.
      7. give examples of animals which set up territories.
      8. list advantages of territoriality.
      9. describe mechanisms animals use to defend territories.
   B. Community Interactions
      1. explain the dependence of life on earth on solar radiation.
      2. explain the concept of ecosystem.
      3. compare and contrast open and closed ecosystems.
      4. explain water cycle, carbon cycle, and nitrogen cycle.
      5. explain succession.

TECH PREP CHEMISTRY

Tech Prep Chemistry is designed for students who will pursue postsecondary educational opportunities which require some background knowledge in chemistry, but not as much indepth theory as required in a college preparatory course. Content areas include metric measurement, solutions, solid, liquids, and gases, the periodic table and nuclear chemistry. Classroom discussions and laboratory investigations are integral parts of the course.

Laboratory experiences will center around the use of the scientific method of experimentation. Lab reports will require complete documentation of procedures and data. Written lab reports will also be an integral part of this course.

COURSE OBJECTIVES

1. Students will explain and use the scientific method in problem solving and laboratory settings.
2. Students will demonstrate a knowledge of safety procedures used in the laboratory.
3. Students will identify and apply metric units of measurement.
4. Students will distinguish between physical and chemical properties.
5. Students will define solution and distinguish among the various types of solutions.
6. Students will interpret and apply various laws relating to the behavior of gases.
7. Students will demonstrate a knowledge of the periodic table.
8. Students will write and balance chemical equations.
9. Students will explain the structure of an atom.
10. Students will define and analyze various types of chemical bonding.
11. Students will identify various types of hydrocarbons according to structure and properties.
12. Students will distinguish among acids, bases, and pH.
13. Students will discuss the various aspects of nuclear chemistry.
14. Students will explain the relationship between chemistry and the community.

STUDENT OBJECTIVES

The student will be able to

- I. INTRODUCTION
  - A. Scientific Method
    1. list and explain the steps in the scientific method.
    2. explain the significance of "control" in an investigation.
    3. state "if...then" hypothesis for a problem.
    4. summarize, in written form, a controlled experiment and the results.
  - B. Measurement
    1. compare and contrast the metric system and the U.S. customary system.
    2. convert measurements within the metric system.
    3. estimate length, volume, and mass in the metric system.
    4. describe an object in terms of length, area, volume, mass, density, and/or temperature.
    5. distinguish among Celsius, Fahrenheit, and Kelvin temperature scales.
    6. convert among Celsius, Fahrenheit, and Kelvin temperature scales.
    7. write numbers in scientific notation.
    8. determine significance of numbers.
    9. distinguish between accuracy and precision.
  - C. Terminology
    1. Chemistry
    2. Energy, Potential and Kinetic
    3. Matter

- II. CLASSIFICATION OF MATTER
  - A. Properties
    1. compare and contrast chemical and physical properties.
    2. state the Law of Conservation of Matter.
    3. state the Law of Conservation of Energy.
    4. apply the Laws of Conservation of Matter and Energy.
    5. distinguish between physical and chemical change.
    6. compare the chemical properties of Nitrogen, Oxygen, and Carbon Dioxide.
    7. compare physical "mixing" with chemical "reacting".
    8. define density
    9. explain density as a physical property.

B. Solutions
   1. define solute, solvent, and solution.
   2. define element, compound, and mixture.
   3. compare and contrast compounds and mixtures.
   4. distinguish among solutions, colloids, and suspensions.
   5. define solubility.
   6. distinguish among insoluble, unsaturated, saturated, and supersaturated.
   7. calculate solution concentration.
   8. describe the effects of temperature on solubility of solids and gases.
   9. explain dissolving from a molecular viewpoint.
   10. explain polarity and nonpolarity of a substance in terms of solubility.
   11. compare and contrast heterogeneous and homogenous solutions.
   12. define endothermic and exothermic reactions.
   13. explain the process of equilibrium.

C. Solids, Liquids, and Gases
   1. define evaporation and condensation.
   2. describe the movement of molecules in solids, liquids, and gases.
   3. define specific heat.
   4. calculate specific heat.
   5. define calorie.
   6. calculate calories.

D. Acids and Bases
   1. define acid, base, and pH.
   2. compare acids and bases in terms of pH.
   3. state the relationship between hydrogen ion concentration and the pH scale.
   4. describe the formation of acids and/or bases.
   5. determine if a substance is acidic, basic, or neutral.
   6. describe the process of neutralization.

III. SYMBOLS AND FORMULAS

A. Symbols
   1. match the symbol with the name of a given element.
   2. interpret symbols in balanced chemical equations.
   3. write symbols and names of ion.

B. Formulas
   1. define chemical formula.
   2. write balanced equations.
   3. interpret formulas in equations.
   4. determine percentage composition of a compound.
   5. determine atomic and molecular weights.
   6. determine the formula for ionic compounds.

C. Periodic Table
   1. define periodic table.
   2. classify elements as nonmetals, metalloids, or metals based on physical and chemical properties.
   3. compare and contrast families and periods.
   4. explain the concept of periodic law.
   5. use the periodic table to
      a. predict physical and chemical properties of elements.
      b. write formulas for compounds.
      c. identify atomic masses and atomic numbers.
      d. locate periods and groups of elements.
   6. construct a periodic table given the physical and chemical properties of a set of elements.
   7. predict valences using the periodic table.

VI. CHEMISTRY MATHEMATICS
A. Mole
   1. define mole.
   2. define molar mass.
   3. calculate the molar mass of a compound.
   4. use molarity to express solution concentration.
   5. calculate the percentage composition by mass of a specified element in a compound.
B. Gas Laws
   1. state Avogadro's Law.
   2. explain the relationship among Avogadro's law, the concept of molar volume and the interpretation of chemical equations involving gases.
   3. state Charles' Law.
   4. state Boyle's Law.
   5. solve application problems using Avogadro's, Charles', and Boyle's Laws.
   6. define
      a. molar volume
      b. air pressure
      c. standard temperature and pressure.
      d. ideal gas
      e. kinetic molecular theory
   7. explain how air pressure is measured.
   8. explain gas laws in terms of the kinetic molecular theory of gas.
   9. explain the concept of "zero volume" for a gas.

V. ATOMIC STRUCTURE
A. Atoms
   1. identify the parts of an atom.
   2. explain the electric charge for each part of an atom.
   3. define element.
   4. define mass number and atomic number.
   5. compute mass number and atomic number.
   6. define isotope.
   7. explain the relationship between mass number and isotopes.
   8. define ion, cation, and anion.
   9. construct a Bohr atom diagram for an atom.
   10. determine the orbital and electron configuration notation for any element.

B. Bonding
  1. distinguish between ionic and covalent bonding.
  2. explain the relationship of energy with bond forming and bond breaking.
  3. identify ionic and polar compounds.
  4. draw the electron-dot formula for a bond.
  5 draw the structural formula of a bond.

VI. BRANCHES OF CHEMISTRY

A. Organic Chemistry
  1. list two factors which account for the diversity in organic compounds.
  2. define isomer.
  3. draw the structural formulas of isomers.
  4. name and draw the structural and electron-dot formula for alkanes, alkynes, alkenes, aromatics, ester, and alcohols.
  5. define heat of combustion.
  6. balance equations which symbolize heat of combustion.
  7. compare and contrast saturated and unsaturated hydrocarbons in terms of chemical formulas and physical and chemical properties.
  8. distinguish between straight-chain and branched-chain alkanes.
  9. define viscosity.
  10. explain the process of fractional distillation.
  11. describe the addition polymerization reaction.
  12. describe the condensation polymerization reaction.

B. Nuclear Chemistry
  1. define isotope.
  2. calculate the molar mass of an element from isotopic abundance data.
  3. calculate an element's isotopic composition given its molar mass and isotopic mass.
  4. compare and contrast alpha, beta, and gamma particles.
  5. describe the properties of alpha, beta, and gamma radiation.
  6. define radioactive decay.
  7. define half-life.
  8. explain a radioactive decay curve.
  9. define nuclear transmutation.
  10. explain $E = mc$
  11. compare and contrast nuclear fission and nuclear fusion.
  12. compare and contrast nuclear fission reaction with exothermic chemical reaction.
  13. discuss the pros and cons of nuclear technologies.

C. Biochemistry
   1. name the physical and chemical properties of fats, carbohydrates, and proteins.
   2. compare and contrast monosaccharides, disaccharides, and polysaccharides.
   3. compare and contrast the structural formulas of fats and carbohydrates.
   4. write a general equation for the formation of a typical fat.
   5. identify five functions of proteins.
   6. define homeostasis.
   7. define enzyme.
   8. explain how enzymes work.
   9. write an equation for the oxidation of glucose.

D. Industrial Chemistry.
   1. identify risks and benefits of the chemical industry to the community.
   2. distinguish between product and service divisions of chemical companies.
   3. describe the the most common components of fertilizer.
   4. describe the role of phosphate in fertilizer.
   5. explain nitrogen fixation.

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TECH PREP ENGLISH I

OVERVIEW

The oral and written components of the English program will prepare the student to communicate in all phases of life. Specific attention will be given to oral communication, grammar, composition, and life study skills. The course will reinforce skills learned in earlier grades, as well as introduce new skills. Emphasis will be given to developing competency in the elements of writing. Applications from the real world will be used throughout the course to give greater relevance to the concepts taught in the classroom.

The literature component will be used to reinforce reading skills taught in the earlier grades. Emphasis will be placed on vocabulary development, interpretation, analysis, and comprehension.

COURSE OBJECTIVES

1. Students will be provided opportunities to practice effective oral communications.
2. Students will be provided opportunities to learn effective grammar.
3. Students will be provided opportunities to practice the elements of writing.
4. Students will be provided opportunities to gain competency in the area of composition.
5. Students will be provided opportunities to learn to cope with an increasingly complicated technological society through the use of life study skills.
6. Students will be provided opportunities to read, interpret, and analyze various types of literature.
7. Students will be provided opportunities to broaden their vocabulary and increase their critical thinking skills through literature analysis.

STUDENT OBJECTIVES
The student will be able to:

- I. ORAL COMMUNICATION
  - A. Listening
    - 1. Practice attentive listening skills
    - 2. Follow oral directions
    - 3. Process information through critical listening
      - a. analyze feelings
      - b. make conclusions.
      - c. distinguish between fact and opinion
      - d. answer questions during oral discussions
  - B. Speaking
    - 1. Improve conversation skills through
      - a. role playing
      - b. use of correct pronunciation
      - c. use of complete sentences
      - d. participation in discussions
    - 2. Make presentations at frequent intervals.
      - a. give directions
      - b. relate experiences
      - c. present oral book reports
      - d. introduce speakers
      - e. recite poems
      - f. make impromptu speeches
  - C. Viewing/Observing
    - 1. Develop observation skills
      - a. visual aids
      - b. pantomime
      - c. analyze dramatic presentations
      - d. interpret tone, pitch, and gestures
    - 2. Apply observation skills for evaluation

- II. GRAMMAR
  - A. Parts Of Speech
    - 1. Nouns
      - a. recognize nouns
      - b. use nouns correctly
    - 2. Pronouns
      - a. recognize types of pronouns
      - b. use pronouns correctly
      - c. identify antecedents of pronouns
      - d. use pronoun-antecedent agreements
    - 3. Verbs
      - a. identify verbs
      - b. distinguish between active and passive voice
      - c. recognize various forms of verbs
      - d. recognize all moods of verbs
    - 4. Adverbs
      - a. recognize adverbs
      - b. use adverbs correctly
      - c. recognize conjunctive adverbs
      - d. use conjunctive adverbs correctly

5. Adjectives
   a. recognize adjectives
   b. use adjectives correctly
6. Conjunctions
   a. identify conjunctions
   b. use correlative conjunctions correctly
   c. recognize subordinate conjunctions
7. Prepositions
   a. identify prepositions
   b. use prepositions correctly
8. Interjections
   a. identify interjections
   b. use interjections correctly

B. Mechanics
   1. Capitalize and spell words correctly
   2. Use appropriate punctuation marks
      a. commas
      b. colons, semicolons
      c. parenthesis, brackets
      d. quotation marks
      e. hyphens, dashes
      f. end marks

C. Usage
   1. Identify and avoid double negatives
   2. Recognize appositives and appositive phrases
   3. Identify/recognize and use
      a. participles and participial phrases
      b. gerunds and gerund phrases
      c. infinitives and infinitive phrases
   4. Use subject-verb agreement
   5. Distinguish between standard and nonstandard usage
   6. Use active and passive voice correctly

III. COMPOSITION

A. Elements
   1. Develop pre-writing skills
      a. brainstorming
      b. listing/jotting/outlining
      c. journalizing
      d. utilizing prompts
   2. Write rough drafts
      a. limit the topic
      b. focus on a purpose
      c. determine target audience
      d. formalize the outline
   3. Revise rough drafts
      a. rethink development, order, emphasis, and word choices
      b. reexamine supporting information, concrete examples, transitional words, phrases and sentences
      c. proofread
      d. put in manuscript form
   4. Finalize the manuscript

- B. Writing Progression
  - 1. Write sentences
    - a. identify and write
      - 1. simple sentences
      - 2. compound sentences
      - 3. complex sentences
      - 4. compound-complex sentences
    - b. write sentences using parallel structure
    - c. write sentence using a variety of stylistic devices
    - d. identify and use dependent and independent clauses
  - 2. Write paragraphs
    - a. topic sentences
    - b. supporting sentences with details
    - c. concluding sentences
  - 3. Compose a variety of paragraphs
    - a. narrative
    - b. descriptive
    - c. expository
    - d. persuasive
  - 4. Develop essays
    - a. informal outline
    - b. develop a thesis sentence
    - c. write an essay of varying length (at least three paragraphs)
  - 5. Write different types of essays
    - a. personal
    - b. critical
    - c. analytical
    - d. persuasive
    - e. expository
  - 6. Develop research skills
    - a. locate information using the card catalog
    - b. locate information using reference materials
    - c. locate information through the *Reader's Guide to Periodical Literature*
    - d. evaluate the usefulness of sources
    - e. identify proper topics for research
  - 7. Create literary compositions
    - a. write a literary composition
    - b. write a precis
    - c. write a literary analysis
  - 8. Write creatively
    - a. compose poems, short stories
    - b. compose skits, plays
    - c. compose advertisements, slogans, commercials

- IV. LIFE STUDY SKILLS
  - A. Study Skills
    - 1. Take effective notes
    - 2. Organize thoughts through outlines
    - 3. Develop effective library skills
    - 4. Develop test-taking skills
    - 5. Interpret media materials

- B. Letters
    - 1. personal letters
    - 2. thank yous
    - 3. acceptances/regrets
    - 4. business letters
- C. Forms
    - 1. Simple forms
        - a. job applications
        - b. school applications
        - c. drivers' license applications
        - d. credit forms
    - 2. Business forms
        - a. orders
        - b. requests
        - c. complaints

V. LITERATURE

- A. Vocabulary Development
    - 1. Determine the meaning of words
        - a. sight recognition
        - b. contextual clues
        - c. structural meaning
    - 2. Use suffixes and prefixes
    - 3. Read a wide variety of materials
    - 4. Use the dictionary and thesaurus to expand vocabulary
- B. Determining Details
    - 1. Locate key words/ideas
    - 2. Determine chronological order
- C. Interpreting Literature
    - 1. Generate main idea (stated/inferred)
    - 2. Make comparisons
    - 3. Draw conclusions
    - 4. Predict outcomes
    - 5. Determine cause and effect
    - 6. Recognize use of dialect
    - 7. Identify stylistic types
- D. Analyze Literature
    - 1. Determine nature of information presented
    - 2. Identify structural elements
    - 3. identify use of rhetorical devices
    - 4. Determine moral/ethic issues
- E. Types of Literature
    - 1. Distinguish between fiction and nonfiction
    - 2. Identify poetic devices
    - 3. Distinguish among comedy, tragedy, mythology

TECH PREP ENGLISH II

OVERVIEW

The oral and written components of the English program will prepare the student to communicate in all phases of life. Specific attention will be given to oral communication, grammar, composition, and life study skills. The course will reinforce skills learned in earlier grades, as well as introduce new skills. Emphasis will be given to developing competency in the elements of writing. Applications from the real world will be used throughout the course to give greater relevance to the concepts taught in the classroom.

The literature component will be used to reinforce reading skills taught in the earlier grades. Emphasis will be placed on vocabulary development, interpretation, analysis, and comprehension.

COURSE OBJECTIVES

1. The student will be provided opportunities to practice effective oral communication.
2. The student will be provided opportunities to learn effective grammar.
3. The student will be provided opportunities to practice the elements of writing.
4. The student will be provided opportunities to gain competency in the area of composition.
5. The student will be provided opportunities to learn to cope with an increasingly complicated technological society through the use of life study skills.
6. The student will be provided opportunities to read, interpret, and analyze various types of literature.
7. The student will be provided opportunities to broaden their vocabulary and increase their critical thinking skills through literature analysis.

STUDENT OBJECTIVES

The student will be able to:

I. ORAL COMMUNICATION
  A. Listening
    1. Practice attentive listening skills
    2. Follow oral directions
    3. Process information through critical listening
      a. analyze feelings
      b. make conclusions
      c. distinguish between fact and opinion
      d. answer questions during oral discussions
  B. Speaking
    1. Improve conversation skills
      a. role playing
      b. use correct pronunciation
      c. use complete sentences
      d. participate in discussions
    2. Give presentations at frequent intervals
      a. give directions
      b. relate experiences
      c. present oral book reports
      d. introduce speakers
      e. recite poems
      f. make impromptu speeches
      g. participate in panel discussions
      h. participate in mock interviews
  C. Viewing/Observing
    1. Develop observation skills
      a. visual aids
      b. pantomime
      c. analyze dramatic presentations
      d. interpret tone, pitch, and gestures
    2. Apply observation skills for evaluation

II. GRAMMAR
  A. Parts of speech
    1. Nouns
      a. recognize nouns
      b. use nouns correctly
    2. Pronouns
      a. recognize types of pronouns
      b. use pronouns correctly
      c. identify antecedents of relative pronouns
      d. use pronoun-antecedent agreements
      e. use 'who' and 'whom' correctly
    3. Verbs
      a. recognize verbs
      b. use verbs correctly
      c. distinguish between active and passive voice
      d. recognize indicative, imperative, and subjunctive moods of verbs

4. Adverbs
   a. recognize adverbs
   b. use adverbs correctly
   c. recognize conjunctive adverbs
   d. use conjunctive adverbs correctly
   e. recognize adverbial nouns
5. Adjectives
   a. recognize adjectives
   b. use adjectives correctly
6. Conjunctions
   a. identify conjunctions
   b. use conjunctions correctly
   c. use correlative conjunctions correctly
   d. use correlative conjunctions with parallel elements
7. Prepositions
   a. identify prepositions
   b. use prepositions correctly
8. Interjections
   a. identify interjections
   b. use interjections correctly

B. Mechanics
   1. Capitalize and spell words correctly
   2. Use appropriate punctuation marks
      a. commas
      b. colons, semicolons
      c. parenthesis, brackets
      c. quotation marks
      d. hyphens, dashes
      e. end marks

C. Usage
   1. Recognize and correctly use
      a. participles and participial phrases
      b. gerunds and gerund phrases
      c. infinitives and infinitive phrases
   2. Recognize and avoid misplaced, dangling, and two-way modifiers
   3. Use consistency in tense , voice, person, and mood
   4. Recognize and avoid general, weak, ambiguous, and indefinite references

III. COMPOSITION

A. Elements
   1. Develop pre-writing skills
      a. brainstorming
      b. listing/jotting/outlining
      c. journalizing
      d. utilizing prompts
   2. Write rough drafts
      a. limit the topic
      b. focus on a purpose
      c. determine a target audience
      d. formalize the outline

3. Revise rough drafts
   a. rethink development, order, emphasis, and word choices
   b. reexamine supporting information, concrete examples, transitional words, phrases, and sentences
   c. proofread
   d. put into manuscript form
4. Finalize the manuscript

B. Writing progression
   1. Write sentences
      a. identify and write
         1. simple sentences
         2. compound sentences
         3. complex sentences
         4. compound-complex sentences
      b. write sentences using parallel structure
      c. identify and use dependent and independent clauses
      d. recognize essential and non-essential clauses
      e. write sentences using a variety of stylistic devices
   2. Write paragraphs
      a. topic sentences
      b. supporting sentences with details
      c. concluding sentences
      d. informal paragraph outlines
   3. Compose a variety of paragraphs
      a. narrative
      b. descriptive
      c. expository
      d. persuasive
      e. comparison
      f. contrast
      g. reason
   4. Develop essays
      a. write formal/informal outlines
      b. develop a thesis sentence
      c. write essays of varying lengths (at least three paragraphs)
      d. use transitional devices within and between paragraphs
      e. write personal, critical, analytical, persuasive, or expository essays
   5. Develop research skills
      a. locate information sing the card catalog
      b. locate information using reference materials
      c. locate information using the *Reader's Guide to Periodical Literature*
      d. gather and organize information using note cards and bibliography cards
   6. Create literary compositions
      a. precis
      b. comparison/contrast compositions
      c. literary analysis using elements such as character, point of view, conflict, theme
   7. Write creatively
      a. poems, short stories
      b. skits, plays
      c. advertisements, slogans, commercials

IV. LIFE STUDY SKILLS

- A. Study Skills
    - 1. Take effective notes
    - 2. Organize thoughts through outlines
    - 3. Develop effective library skills
    - 4. Develop test-taking skills
    - 5. Interpret media materials
- B. Letters
    - 1. Thank yous
    - 2. Acceptances/regrets
    - 3. Personal/business letters
    - 4. Invitations
- C. Forms
    - 1. Simple forms
        - a. job applications
        - b. school applications
        - c. credit applications
    - 2. Business forms
        - a. orders/requests
        - b. complaints/adjustments
        - c. informational

V. LITERATURE

- A. Vocabulary Development
    - 1. Determine the meaning of words
        - a. sight recognition
        - b. contextual clues
        - c. structural meaning
    - 2. Use prefixes and suffixes
    - 3. Read a wide variety of materials
- B. Determining Details
    - 1. Locate key words/ideas
    - 2. Determine chronological order
- C. Interpreting Literature
    - 1. Generate main idea (stated or inferred)
    - 2. Make comparisons
    - 3. Draw conclusions
    - 4. Predict outcomes
    - 5. Determine cause and effect
    - 6. Recognize use of literary devices
    - 7. Identify stylistic types
- D. Analyze literature
    - 1. Determine nature of information presented
    - 2. Identify structural elements
    - 3. Identify rhetorical devices
    - 4. Determine moral, ethical, or psychological issues
- E. Types of literature
    - 1. Drama
        - a. Shakespearean
        - b. Greek
        - c. modern
    - 2. Romance tales
    - 3. Poetry

TECH PREP ENGLISH III

OVERVIEW

The oral and written components of the English program will prepare the student to communicate in all phases of life. Specific attention will be given to oral communication, grammar, composition, and life study skills. The course will reinforce skills learned in earlier grades, as well as introduce new skills. Emphasis will be given to developing competency in the elements of writing. Applications from the real world will be used throughout the course to give greater relevance to the concepts taught in the classroom.

The literature component will be used to reinforce reading skills taught in the earlier grades. Emphasis will be placed on vocabulary development, interpretation, analysis, literal and inferential comprehension, and listening skills.

COURSE OBJECTIVES

1. The student will be provided opportunities to practice effective oral communication.

2. The student will be provided opportunities to learn effective grammar.

3. The student will be provided opportunities to practice the elements of writing.

4. The student will be provided opportunities to gain competency in the area of composition.

5. The student will be provided opportunities to learn to cope with an increasingly complicated technological society through the use of life study skills.

6. The student will be provided opportunities to read, interpret, and analyze various types of literature.

7. The student will be provided opportunities to broaden their vocabulary and increase their critical thinking skills through literature analysis.

STUDENT OBJECTIVES
The student will be able to:

- I. ORAL COMMUNICATION
  - A. Listening
    - 1. Practice attentive listening skills
    - 2. Follow oral directions
    - 3. Process information through critical listening
      - a. analyze feelings
      - b. make conclusions
      - c. distinguish between fact and opinion
      - d. answer questions during oral discussions
  - B. Speaking
    - 1. Improve conversation skills
      - a. role playing
      - b. use correct pronunciation
      - c. use complete sentences
      - d. participate in discussions
    - 2. Make presentations at frequent intervals
      - a. give directions
      - b. relate experiences
      - c. present oral book reports
      - d. introduce speakers
      - e. recite poems
      - f. make impromptu speeches
      - g. participate in panel discussions
      - h. participate in mock interviews
  - C. Viewing/Observing
    - 1. Develop observation skills
      - a. visual aids
      - b. pantomime
      - c. analyze dramatic presentations
      - d. interpret tone, pitch, and gestures
    - 2. Apply observation skills for evaluation

- II. GRAMMAR
  - A. Parts of speech
    - 1. Nouns
      - a. recognize nouns
      - b. use nouns correctly
    - 2. Pronouns
      - a. recognize types of pronouns
      - b. use pronouns correctly
      - c. identify antecedents of relative pronouns
      - d. use pronoun-antecedent agreements
      - e. use 'who' and 'whom' correctly
    - 3. Verbs
      - a. recognize verbs
      - b. use verbs correctly
      - c. distinguish between active and passive voice
      - d. recognize indicative, imperative, and subjunctive moods of verbs

4. Adverbs
   a. recognize adverbs
   b. use adverbs correctly
   c. recognize conjunctive adverbs
   d. use conjunctive adverbs correctly
   e. recognize adverbial nouns
5. Adjectives
   a. recognize adjectives
   b. use adjectives correctly
6. Conjunctions
   a. identify conjunctions
   b. use conjunctions correctly
   c. use correlative conjunctions correctly
   d. use correlative conjunctions with parallel elements
7. Prepositions
   a. identify prepositions
   b. use prepositions correctly
8. Interjections
   a. identify interjections
   b. use interjections correctly

B. Mechanics
1. Capitalize and spell words correctly
2. Use appropriate punctuation marks
   a. commas
   b. colons, semicolons
   c. parenthesis, brackets
   c. quotation marks
   d. hyphens, dashes
   e. end marks

C. Usage
1. Recognize and correctly use
   a. participles and participial phrases
   b. gerunds and gerund phrases
   c. infinitives and infinitive phrases
2. Recognize and avoid misplaced, dangling, and two-way modifiers
3. Use consistency in tense, voice, person, and mood
4. Recognize and avoid general, weak, ambiguous, and indefinite references
5. Use parallel ideas in the same grammatical form

III. COMPOSITION

A. Elements
1. Develop pre-writing skills
   a. brainstorming
   b. listing/jotting/outlining
   c. journalizing
   d. utilizing prompts
   e. utilize the 5 W's
2. Write rough drafts
   a. limit the topic
   b. focus on a purpose
   c. determine a target audience
   d. formalize the outline
   e. with or without prompts

   3. Revise rough drafts
      a. rethink development, order, emphasis, and word choices
      b. reexamine supporting information, concrete examples, transitional words, phrases, and sentences
      c. proofread
      d. put into manuscript form
   4. Finalize the manuscript

B. Writing progression
   1. Write sentences
      a. identify and write
         1. simple sentences
         2. compound sentences
         3. complex sentences
         4. compound-complex sentences
      b. write sentences using parallel structure
      c. identify and use dependent and independent clauses
      d. recognize essential and non-essential clauses
      e. write sentences using a variety of stylistic devices
   2. Write paragraphs
      a. topic sentences
      b. supporting sentences with details
      c. concluding sentences
      d. informal paragraph outlines
   3. Compose a variety of paragraphs
      a. narrative
      b. descriptive
      c. expository
      d. persuasive
      e. comparison
      f. contrast
      g. reason
   4. Develop essays
      a. formal/informal outlines
      b. develop a thesis sentence
      c. essays of varying lengths (at least three paragraphs)
      d. use transitional devices within and between paragraphs
      e. personal, critical, analytical, persuasive, or expository essays
   5. Develop research skills
      a. locate information using the card catalog
      b. locate information using reference materials
      c. locate information using the *Reader's Guide to Periodical Literature*
      d. determine types of sources suitable for introductory reading
      e. gather and organize information using note cards and bibliography cards
      f. recognize the function of a working bibliography
      g. complete footnotes
   6. Create literary compositions
      a. precis
      b. comparison/contrast compositions
      c. literary analysis using elements such as character, point of view, conflict, theme
      d. personal resume

7. Write creatively
    a. poems, short stories
    b. skits, plays
    c. advertisements, slogans, commercials

IV. LIFE STUDY SKILLS
  A. Study Skills
    1. Take effective notes
    2. Organize thoughts through outlines
    3. Develop effective library skills
    4. Develop test-taking skills
    5. Interpret media materials
  B. Letters
    1. acceptances/regrets
    2. personal/business letters
    3. invitations
  C. Forms
    1. Simple forms
      a. job applications
      b. school applications
      c. credit applications
    2. Business forms
      a. orders/requests
      b. complaints/adjustments
      c. informational

V. LITERATURE
  A. Vocabulary Development
    1. Determine the meaning of words
      a. sight recognition
      b. contextual clues
      c. structural meaning
    2. Use roots, prefixes, and suffixes
    3. Read a wide variety of materials
    4. Use the dictionary and thesaurus to expand vocabulary
  B. Determining Details
    1. Locate key words/ideas
    2. Determine chronological order
  C. Interpreting Literature
    1. Generate main idea (stated or inferred)
    2. Make comparisons
    3. Draw conclusions
    4. Predict outcomes
    5. Determine cause and effect
    6. Recognize use of literary devices
    7. Identify stylistic types
  D. Analyze literature
    1. Determine nature of information presented
    2. Identify structural elements
    3. Identify rhetorical devices
    4. Determine moral, ethical, or psychological issues
    5. Analyze various philosophies and personalities that have impacted American culture

E. Types of literature
    1. American
        a. colonial
        b. revolutionary
        c. romantic
        d. American renaissance
        e. realism
        f. contemporary

TECH PREP ENGLISH IV

OVERVIEW

The oral and written components of the English program will prepare the student to communicate in all phases of life. Specific attention will be given to oral communication, grammar, composition, and life study skills. The course will reinforce skills learned in earlier grades, as well as introduce new skills. Emphasis will be given to developing competency in the elements of writing. Applications from the real world will be used throughout the course to give greater relevance to the concepts taught in the classroom.

The literature component will be used to reinforce reading skills taught in the earlier grades. Emphasis will be placed on vocabulary development, interpretation, analysis, literal and inferential comprehension, and listening skills.

COURSE OBJECTIVES

1. The student will be provided opportunities to practice effective oral communication.

2. The student will be provided opportunities to learn effective grammar.

3. The student will be provided opportunities to practice the elements of writing.

4. The student will be provided opportunities to gain competency in the area of composition.

5. The student will be provided opportunities to learn to cope with an increasingly complicated technological society through the use of life study skills.

6. The student will be provided opportunities to read, interpret, and analyze various types of literature.

7. The student will be provided opportunities to broaden their vocabulary and increase their critical thinking skills through literature analysis.

STUDENT OBJECTIVES

The student will be able to:

- I. ORAL COMMUNICATION
  - A. Listening
    - 1. Practice attentive listening skills
    - 2. Implement oral directions
    - 3. Process information through critical listening
      - a. analyze feelings
      - b. make conclusions
      - c. distinguish between fact and opinion
      - d. answer questions during oral discussions
  - B. Speaking
    - 1. Improve conversation skills
      - a. participate in class discussions
      - b. respond clearly and concisely
    - 2. Give presentations at frequent intervals
      - a. present oral book reports
      - b. introduce speakers
      - c. recite poems
      - d. make impromptu speeches
      - e. participate in panel discussions
  - C. Viewing/Observing
    - 1. Develop observation skills
      - a. interpret visual aids
      - b. pantomime
      - c. analyze dramatic presentations
      - d. interpret tone, pitch, and gestures
    - 2. Apply observation skills for evaluation

- II. GRAMMAR
  - A. Parts of speech
    - 1. Recognize the eight parts of speech
    - 2. Apply the eight parts of speech
  - B. Mechanics
    - 1. Capitalize and spell words correctly
    - 2. Use appropriate punctuation marks
  - C. Usage
    - 1. Recognize and correctly use
      - a. participles and participial phrases
      - b. gerunds and gerund phrases
      - c. infinitives and infinitive phrases
    - 2. Recognize and avoid misplaced, dangling, and two-way modifiers
    - 3. Use consistency in tense, voice, person, and mood
    - 4. Recognize and avoid general, weak, ambiguous, and indefinite references
    - 5. Use parallel ideas in the same grammatical form

III. COMPOSITION

- A. Elements
  - 1. Develop pre-writing skills
    - a. brainstorming
    - b. listing/jotting/outlining
    - c. journalizing
    - d. utilizing prompts
    - e. utilizing the 5 W's
  - 2. Write rough drafts
    - a. limit the topic
    - b. focus on a purpose
    - c. determine a target audience
    - d. formalize the outline
    - e. with or without prompts
  - 3. Revise rough drafts
    - a. rethink development, order, emphasis, and word choices
    - b. reexamine supporting information, concrete examples, transitional words, phrases, and sentences
    - c. edit for syntax, style, accuracy, voice, audience
  - 4. Finalize the draft
- B. Writing progression
  - 1. Utilize sentence variety
  - 2. Write paragraphs
    - a. topic sentences
    - b. supporting sentences with details
    - c. concluding sentences
    - d. informal paragraph outlines
  - 3. Compose a variety of paragraphs
    - a. narrative
    - b. descriptive
    - c. expository
    - d. persuasive
    - e. comparison
    - f. contrast
    - g. reason
  - 4. Develop essays
    - a. formal/informal outlines
    - b. develop a thesis sentence
    - c. essays of varying lengths (at least three paragraphs)
    - d. use transitional devices within and between paragraphs
    - e. personal, critical, analytical, persuasive, or expository essays
  - 5. Develop research skills
    - a. locate information using the card catalog
    - b. locate information using reference materials
    - c. locate information using the Reader's Guide to Periodical Literature
    - d. determine types of sources suitable for introductory reading
    - e. gather and organize information using note cards and bibliography cards
    - f. recognize the function of a working bibliography
    - g. complete footnotes

6. Create literary compositions
   - a. precis
   - b. comparison/contrast compositions
   - c. literary analysis using elements such as character, point of view, conflict, theme
   - d. personal resume
7. Write creatively
   - a. poems, short stories
   - b. skits, plays
   - c. advertisements, slogans, commercials

IV. LIFE STUDY SKILLS
- A. Study Skills
  - 1. Reinforce and apply
    - a. notetaking
    - b. SQ3R
    - c. Library skills
- B. Letters
  - 1. Application
  - 2. Inquiry
  - 3. Response to inquiry
- C. Forms
  - 1. Simple forms
  - 2. Business forms

V. LITERATURE
- A. Vocabulary Development
  - 1. Determine the meaning of words
    - a. sight recognition
    - b. contextual clues
    - c. structural meaning
  - 2. Use roots, prefixes, and suffixes
  - 3. Read a wide variety of materials
  - 4. Use the dictionary and thesaurus to expand vocabulary
- B. Determining Details
  - 1. Locate key words/ideas
  - 2. Determine chronological order
- C. Interpreting Literature
  - 1. Generate main idea (stated or inferred)
  - 2. Make comparisons
  - 3. Draw conclusions
  - 4. Predict outcomes
  - 5. Determine cause and effect
  - 6. Recognize use of literary devices
  - 7. Identify stylistic types
- D. Analyze literature
  - 1. Determine nature of information presented
  - 2. Identify structural elements
  - 3. Identify rhetorical devices
  - 4. Determine moral, ethical, or psychological issues
  - 5. Comprehend the significance of literature as a reflection of humanity and its experiences, motives, and conflicts

E. Types of literature
    1. British
        a. Anglo-Saxon period
        b. Medieval period
        c. Renaissance period
        d. Age of reason
        e. Romantic period
        f. Victorian period
        g. Contemporary period

TECH PREP MATH I

Tech Prep Math I is designed to aid students in making the transition from elementary mathematics to the rudiments of higher mathematics. This course provides a review of the basic operations with whole numbers, fractions, decimals, and percents. Tech Prep Math I also covers the fundamental principles of number theory, geometry, standard and metric measurement systems, and statistics.

COURSE OBJECTIVES

1. Students will perform basic operations involving whole numbers, fractions, decimals, and percent.

2. Students will understand and use number theory.

3. Students will work with the English and Metric measurements systems.

4. Students will apply geometric theories.

5. Students will identify the basic figures and terms of geometry.

6. Students will use geometric applications.

7. Students will use statistical devices to display data.

STUDENT OBJECTIVES

The student will be able to:

I. BASIC OPERATIONS
  A. Whole Numbers
    1. Define
      a. place value
      b. addend
      c. sum
      d. subtrahend
      e. minuend
      f. difference
      g. multiplicand
      h. multiplier
      i. product
      j. divisor
      k. dividend
      l. quotient
    2. Add at least 5-digit numbers with regrouping
    3. Subtract at least 4-digit numbers with regrouping
    4. Multiply numbers using 3-digit multipliers
    5. Divide numbers using 3-digit divisors
    6. Round numbers to nearest million, hundred-thousand, ten-thousand, thousand, hundred, or ten
    7. Simplify expressions using order of operations and symbols of inclusion
    8. Estimate
      a. sums
      b. products
      c. differences
      d. quotients
  B. Fractions
    1. Explain the meaning of fraction
    2. Identify numerator and denominator
    3. Write improper fractions as mixed numbers and vice versa
    4. Define and use reciprocals
    5. Add fractions and/or mixed numbers with like and/or unlike denominators
    6. Subtract fractions and/or mixed numbers with like and/or unlike denominators
    7. Multiply fractions, mixed numbers and/or whole numbers or any combination thereof
    8. Divide fractions, mixed numbers, and/or whole numbers or any combination thereof
    9. Compare, order, and/or determine equivalence of fractions and/or mixed numbers
    10. Define ratio and proportion
    11. Write ratios
    12. Set up and solve proportions correctly
    13. Simplify expressions using order of operations and symbols of inclusion
    14. Estimate
      a. sums
      b. products
      c. differences
      d. quotients

C. Decimals
  1. Explain the meaning of a decimal
  2. Explain terminating and repeating decimals
  3. Change decimals to fractions and vice versa
  4. Perform operations with decimals
    a. addition
    b. subtraction
    c. multiplication
    d. divide
  5. Round decimals to nearest tenth, hundredth, and thousandth
  6. Compare, order, and determine equivalence of decimals
  7. Compare, order, and determine equivalence of decimals, fractions, and/or mixed numbers and any combination thereof
  8. Simplify expressions using order of operations and symbols of inclusion
  9. Estimate
    a. sums
    b. products
    c. differences
    d. quotients

D. Percents
  1. Explain the meaning of percent
  2. Change percents to decimals and vice versa
  3. Change percents to fractions and vice versa
  4. Compare, order, and determine equivalence of percents
  5. Compare, order, and determine equivalence of percents, decimals, fractions and/or mixed numbers and any combination thereof
  6. Define rate, part, base, and discount
  7. Solve percent problems
  8. Simplify expressions using order of operations and symbols of inclusion
  9. Estimate
    a. sums
    b. products
    c. differences
    d. quotients

E. Word Problems
  1. Solve word problems involving whole numbers
    a. addition
    b. subtraction
    c. multiplication
    d. division
    e. multiple operations
  2. Solve word problems involving fractions, decimals, and/or percents, and any combination thereof
    a. addition
    b. subtraction
    c. multiplication
    d. division
    e. multiple operations
  3. Solve word problems involving ratio and proportion

II. NUMBER THEORY

- A. Factors
  - 1. Recognize and/or find factors
- B. Exponents
  - 1. Evaluate exponential numbers
  - 2. Compute squares and cubes of numbers
  - 3. Understand the meaning of the square root symbol
  - 4. Apply scientific notation principles
    - a. write numbers in scientific notation
    - b. add, subtract, multiply, and divide numbers in scientific notation
- C. Prime and Composite Numbers
  - 1. Recognize prime and composite numbers
  - 2. Find the prime factors of a number
  - 3. State and explain the rules of divisibility
  - 4. Find LCM and GCF of two or more numbers

III. GEOMETRY

- A. Terms
  - 1. Define point
  - 2. Define and identify lines
    - a. vertical
    - b. horizontal
    - c. oblique
    - d. perpendicular
    - e. parallel
  - 3. Define ray
  - 4. Define line segment
  - 5. Define and identify angles
    - a. acute
    - b. obtuse
    - c. right
    - d. straight
  - 6. Define and identify vertex
  - 7. Define plane
- B. Circle
  - 1. Define circle
  - 2. Define and identify
    - a. radius
    - b. diameter
    - c. chord
    - d. arc
    - e. semi-circle
- C. Polygons
  - 1. Define and identify
    - a. triangles
      - 1. right
      - 2. obtuse
      - 3. isosceles
      - 4. acute
      - 5. scalene
      - 6. equilateral
    - b. quadrilaterals
      - 1. rectangle
      - 2. parallelogram
      - 3. trapezoid
      - 4. square
      - 5. rhombus
    - c. n-sided polygons

2. Identify parts of polygons
    a. base
    b. side
    c. height
    d. slant height
    e. diagonal
3. Define congruence
4. Apply principles of congruence
5. Define similarity
6. Apply principles of similarity

D. Applications
  1. Find and/or use perimeter of polygons and circumference of circles
  2. Find and/or use area of polygons and circles

E. Scale Drawings
  1. Solve word problems involving scale drawings

F. Word Problems
  1. Solve word problems involving geometric theory
  2 Solve word problems involving geometric applications

IV. MEASUREMENT

A. Standard Measurement
  1. Convert and apply
      a. linear (inches, feet, yards, miles)
      b. weight (ounces, pounds, tons)
      c. capacity (ounces, pints, quarts, gallons)
      d. time (seconds, minutes, hours, days, weeks, years)
  2. Explain and use Fahrenheit temperature scale
  3. Read the scale on a measuring device and make interpolations where required
  4. Solve word problems involving standard measurement

B. Metric Measurement
  1. Convert and apply
      a. linear (meter)
      b. mass (gram)
      c. capacity (liter)
  2. Explain and use Celsius temperature scale
  3. Read the scale on a measuring device and make interpolations where required
  4. Solve word problems involving metric measurement

C. Estimation
  1. Choose the correct measurement unit in both standard and metric systems of measurement
      a. length/distance
      b. weight/mass
      c. capacity
      d. temperature

V. STATISTICS
  A. Graphs
    1. Interpret
      a. line
      b. bar
      c. picto
      d. circle
    2. Construct
      a. line
      b. bar
      c. picto
      d. circle
  B. Tables/charts
    1. Interpret
    2. Construct
  C. Measures of Dispersion
    1. Compute mean
    2. Compute mode
    3. Compute median
    4. Compute range
    5. Compute standard deviation

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TECH PREP MATH II

Tech Prep Math II provides a broader application of algebraic principles used in technical careers. Topics covered include equations, positive and negative numbers, and the real number system. Tech Prep Math II also expands upon the geometric and measurement principles learned in Tech Prep Math I.

COURSE OBJECTIVES

1. Students will use the basic operations with positive and negative numbers.
2. Students will solve a simple equation or inequality.
3. Students will apply algebraic properties.
4. Students will identify and use algebraic terminology and symbolism.
5. Students will identify and apply the basic properties and operations of real numbers.
6. Students will solve first degree equations and inequalities.
7. Students will recognize angles and their measures, classifications, and relationships to one another.
8. Students will explain and solve problems dealing with errors of measurement.

STUDENT OBJECTIVES

The student will be able to:

- I. MEASUREMENT
  - A. Precision
    - 1. determine the precision of any number
    - 2. select appropriate instruments for obtaining a stated degree of precision
  - B. Tolerance
    - 1. Compute maximum tolerance
    - 2. Compute minimum tolerance
  - C. Standard error of measurement
    - 1. compute greatest possible error

- II. EQUATIONS AND INEQUALITIES
  - A. Numbers and Language
    - 1. Define the terms: variable, factor, coefficient, and exponent
    - 2. Use the terms: variable, factor, coefficient, and exponent
  - B. Definitions
    - 1. Identify and explain an equation
    - 2. Identify inverse operations
    - 3. Identify and use
      - a. commutative and associative properties of
        - 1. addition
        - 2. multiplication
      - b. identity and inverse properties of addition
      - c. identity, zero, and inverse properties of multiplication
      - d. distributive properties of equality
      - e. addition and subtraction properties of equality
      - f. the equality properties
        - 1. reflexive
        - 2. symmetric
        - 3. transitive
        - 4. substitution
  - C. Expressions
    - 1. Identify and combine like terms
    - 2. Identify and use coefficients
    - 3. Evaluate an expression
    - 4. Simplify expressions using order of operations
  - D. Equations
    - 1. Solve simple equations (variable in one or more members) and graph solution on a coordinate plane
    - 2. Solve an equation which entails one or more of the definitions of properties given
    - 3. Solve single variable first-degree equations
    - 4. Solve equations using order of operations rules

- E. Inequalities
    1. Recognize an inequality
    2. Solve simple inequalities (variable in one or more members) and graph the solution on a number line
    3. Solve an inequality which entails one or more of the definitions of properties given
    4. Solve inequalities using order of operations rules
- F. Problem Solving
    1. Write an equation or inequality for word problems
    2. Solve word problems using grade level skills
    3. Describe the scientific procedure of solving a thought problem

IV. POSITIVE AND NEGATIVE NUMBERS

- A. Definitions
    1. Define integer
    2. Show on a number line the location and relationship of all integers
    3. Explain the theory of additive inverse
- B. Operations
    1. Add
        - a. integers
        - b. positive/negative numbers
    2. Subtract
        - a. integers
        - b. positive/negative numbers
    3. Multiply
        - a. integers
        - b. positive/negative numbers
    4. Divide
        - a. integers
        - b. positive/negative numbers
    5. Perform mixed operations
        - a. integers
        - b. positive/negative numbers
    6. Apply relational symbols
        - a. use $<$, $>$, $=$, and $=$ to compare positive and negative numbers
    7. Simplify expressions using order of operations and symbols of inclusion

V. THE REAL NUMBER SYSTEM

- A. Basic Properties
    1. Identify reflexive, symmetric, and transitive properties
    2. Identify and correctly apply the commutative and associative properties for addition and multiplication

3. Identify and apply the distributive property of multiplication
4. Use <, >, =, and = to compare real numbers
5. Apply rules of additive inverses
6. Apply rules of multiplicative inverses
7. Simplify expressions using
    a. commutative and multiplicative properties
    b. distributive property
    c. additive and multiplicative inverses

B. Operations with Real Numbers
1. Add
2. Subtract
3. Multiply
4. Divide
5. Perform multiple operations
6. Simplify expressions using order of operations and symbols of inclusion

VI. GEOMETRY

A. Volume
1. Find and use the volumes of certain prisms
    a. rectangular
    b. triangular
    c. pyramid
2. Find and use the volumes of spheres

B. Points, Lines, Planes, and Space
1. Identify basic undefined terms
2. Recognize basic definitions of coplanar, collinear, space, and betweenness
3. Identify and recognize symbols for segments, lines, and rays
4. Determine the distance between points
5. Recognize and use the definitions: congruent segments, midpoint, and bisector of a segment
6. Compute midpoint
7. Determine the distance between a point and a line

C. Angles
1. Identify and recognize the symbol for angles and angle names
2. Use a protractor
3. Measure angles
4. Classify angles
5. Recognize the angles relationships of congruent, adjacent, vertical, complementary, and supplementary
6. Solve word problems involving complementary and supplementary angle relationships
7. Recognize the bisector of an angle

D. Word Problems
1. Solve word problems involving geometric theory
2. Solve word problems involving geometric applications

TECH PREP MATH III

Tech Prep Math III is designed to give students a greater understanding of geometry. Topics include in Tech Prep Math III are coordinate systems, parallel and perpendicular lines, right triangles, and polygons and applications for each of these areas. The concept of probability and its applications are also covered in Tech Prep Math III.

COURSE OBJECTIVES

1. Students will graph linear equalities and inequalities in two-variables.
2. Students will determine the equations of lines.
3. Students will solve systems of equations.
4. Students will solve right triangles.
5. Students will identify and define parallel and perpendicular lines and planes.
6. Students will define and classify triangles.
7. Students will classify polygons and apply formulas concerning the measure of angles of polygons.
8. Students will classify quadrilaterals, use and apply the properties of quadrilaterals.
9. Students will apply properties of proportions as they relate to similar polygons.
10. Students will apply the Pythagorean Theorem and other special properties associated with right triangles.
11. Students will find the measures of angles, arcs, and segments as related to circles.
12. Students will compute the area and volume of plane and solid figures.
13. Students will use a compass and straightedge to perform basic constructions.
14. Students will compute the probability of a given event.

STUDENT OBJECTIVES
The student will be able to:

- I. COORDINATE GEOMETRY
  - A. Graphing
    - 1. Graph an ordered pair
    - 2. Graph linear equations in two variables
    - 3. Graph linear inequalities in two variables
  - B. Slope
    - 1. Determine the slope of a line
    - 2. Determine the equation of a line
  - C. Systems of Open Sentences
    - 1. Graph systems of linear equalities and inequalities
    - 2. Solve systems of linear equations and inequalities
    - 3. Solve word problems involving systems of linear equations and inequalities

- II. GEOMETRY
  - A. Perpendicular Lines and Planes
    - 1. Recognize right angles and perpendicular lines and planes
    - 2. Recognize and use symbols for perpendicular lines
  - B. Parallel Lines and Planes
    - 1. Recognize parallel and skew lines
    - 2. Recognize and use symbols for parallel lines
    - 3. Define and identify transversals
    - 4. Identify angles formed by transversals
    - 5. Apply rules governing parallel lines and transversals and the angles formed
  - C. Triangles
    - 1. Define and classify triangles with respects to sides and angles
    - 2. Apply the angle sum theory for triangles
    - 3. Recognize interior and exterior angles
    - 4. Identify corresponding parts of triangles
    - 5. Define and identify congruent triangles
    - 6. Define and identify altitudes and medians of triangles
  - D. Right Triangles
    - 1. Use properties of right triangles to find lengths of sides and altitudes of right triangles
    - 2. Apply Pythagorean Theorem to solve right triangle
    - 3. Determine functions of special right triangles (45-45-90 and 30-60-90)
    - 4. Find the lengths of segments in 45-45-90 and 30-60-90 triangles
    - 5. Use basic trigonometric functions (sine, cosine, tangent) to solve right triangles
    - 6. Use calculators to solve trigonometric functions

E. Concave and Convex Polygons
   1. Define concave and convex polygons
   2. Identify and name polygons
   3. Develop and apply the formulas for the sum of the interior and exterior angles of convex polygons
   4. Identify regular polygons
   5. Determine angle measures of polygons
   6. Find the measures of exterior angles of triangles and polygons

F. Quadrilaterals
   1. Define and identify
      a. parallelograms
      b. rectangles
      c. trapezoids
      d. squares,
      e. rhombuses
   2. Investigate properties of quadrilaterals
   3. Apply properties
      a. parallelograms
      b. rectangles
      c. squares
      d. trapezoids
   4. Identify the type of quadrilateral being described given various properties

G. Similar Polygons
   1. Identify and solve similar polygons
   2. Prove triangle similar by applying basic rules governing similarity
   3. Apply theorems of proportion involving similar polygons

H. Circles
   1. Define terms
      a. define basic terms related to circles
      b. identify internally and externally tangent, concentric and congruent circles
      c. define and identify special angles related to circles
      d. define major and minor arcs and semi-circles
   2. Apply principles
      a. find the measure of an arc
      b. find the measure of special angles of circles given arc measures
      c. find the length of special segments related to circles

I. Plane and Solid Figures
   1. Compute area
      a. apply formulas for areas of triangles and quadrilaterals
      b. apply the formula for the area of regular polygons
      c. apply the formula for the area of circles
      d. find lateral area and total area of solids
   2. Compute volume
      a. apply formulas for volumes of
         1. prisms
         2. cylinders
         3. spheres
         4. pyramids
         5. cones

- J. Constructions
    1. Construct congruent segments and angles
    2. Bisect angles and segments
    3. Construct perpendiculars and parallels
    4. Construct angles of certain measures
    5. Construct tangents to circles
    6. Construct quadrilaterals and regular polygons

III. PROBABILITY

- A. Probability
    1. Use elementary notations of probability
    2. Find the probability of two or more independent events
    3. Find the probability of two or more dependent events
    4. Solve word problems using permutations and combinations

TECH PREP MATH IV

Tech Prep Math IV is for students who have completed Tech Prep Math III and wish to explore higher-order math skills. Applications from this course include algebraic fractions, radicals, quadratics, and formal proofs in geometry.

COURSE OBJECTIVES

1. Students will perform basic operations with polynomials.
2. Students will factor polynomial expressions and solve second degree equations.
3. Students will perform the basic operations with algebraic fractions.
4. Students will solve and apply fractional equations.
5. Students will solve and apply quadratic equations.
6. Students will simplify and perform the basic operations with radicals.
7. Students will know the relationships of postulates and theorems to geometry.
8. Students will use the concepts of deductive reasoning in two-column formal proofs.
9. Students will prove and apply congruent triangles.

STUDENT OBJECTIVES

The students will be able to:

- I. ALGEBRAIC FRACTIONS
  - A. Operations
    - 1. Add
    - 2. Subtract
    - 3. Multiply
    - 4. Divide
  - B. Applications
    - 1. Solve fractional equations
    - 2. Solve word problems involving fractional equations
    - 3. Simplify algebraic fractions
  - C. Complex Fractions
    - 1. Simplify complex fractions

- II. POLYNOMIALS
  - A. Operations
    - 1. Recognize and combine similar terms
    - 2. Remove grouping symbols to simplify expressions
    - 3. Add and subtract polynomial expressions
    - 4. Apply the laws of exponents using positive integral exponents
    - 5. Multiply polynomials
    - 6. Divide polynomials
  - B. Factors
    - 1. Factor binomials
    - 2. Factor polynomials with three or more terms
  - C. Applications
    - 1. Solve second-degree equations
    - 2. Solve word problems involving second-degree equations
  - D. Variation
    - 1. Define direct variation
    - 2. Solve word problems involving direct variation
    - 3. Define indirect variation
    - 4. Solve word problems involving indirect variation

- III. RADICALS
    - 1. Simplify radicals using product and quotient properties of roots
    - 2. Manipulate radical expressions
      - a. add
      - b. subtract
      - c. multiply
      - d. divide
    - 3. Solve simple radical equations involving one radical
    - 4. Apply the Pythagorean Theorem to find the length of a side of a triangle
    - 5. Apply the distance formula
- IV. QUADRATICS
  - A. Roots
    - 1. Solve quadratic equations by completing the square
    - 2. Solve quadratic equations by using the quadratic formula
    - 3. Solve quadratic equations by graphing

B. Applications
   1. Determine the best method for solving second-degree equations
   2. Determine the equations for solving word problems
   3. Solve word problems

V. GEOMETRY
   A. Proofs
      1. Recognize and apply basic postulates and theorems about lines, points, and planes
      2. Understand deductive and inductive reasoning
      3. Recognize and demonstrate two-column proofs
      4. Recognize and apply the basic definitions, postulates, and theorems about angles
      5. Apply theorems and demonstrate two-column proofs on parallel and perpendicular lines
      6. Apply method of indirect proof
      7. State and use SSS, SAS, ASA, AAS to prove triangles congruent
      8. State and use HA, LA, HL, LL to prove right triangles congruent
      9. Apply the postulates and theorems of congruency of triangles
      10. Demonstrate two-column deductive proof with congruent triangles
      11. Use "corresponding parts of congruent triangles are congruent"
      12. Prove triangles congruent using corresponding parts of other congruent triangles
      13. Prove and apply theorems about isosceles triangles
      14. Prove triangles similar by applying basic postulates and theorems of similarity
      15. Prove properties of polygons using coordinate geometry

TECH PREP PHYSICAL SCIENCE

Tech Prep Science is intended to introduce students to the basic concepts within the scientific branches of chemistry, physics, genetics, and ecology. However, the major focus of the course will be the areas of chemistry and physics. Tech Prep Science is designed for students who will pursue postsecondary educational opportunities at a two-year college. This course will also help increase the science skills of those students who wish to enter the workforce upon completion of high school.

This will be a laboratory oriented course with emphasis upon basic lab techniques, measurement, and problem solving skills. The scientific method will be emphasized throughout the course. Additional emphasis will be placed on safety in the laboratory.

COURSE OBJECTIVES

1. Students will explain and use the scientific method in solving problems.
2. Students will demonstrate a knowledge of safety procedures used in the laboratory.
3. Students will identify and apply metric units of measurement.
4. Students will define and classify matter.
5. Students will define energy and identify its various forms.
6. Students will identify simple machines and calculate efficiency, power, work, and horsepower.
7. Students will identify types of motion and explain the relationship between force and motion.
8. Students will distinguish between heat and temperature.
9. Students will identify the properties of light.
10. Students will describe the properties of color.
11. Students will observe and apply the basic principles of electricity and magnetism.
12. Students will identify various waves.
13. Students will distinguish among elements, compounds, and mixtures.
14. Students will define and apply the basic principles of genetics.
15. Students will describe the various components of an ecosystem.

STUDENT OBJECTIVES
The student will be able to:

I. SCIENTIFIC METHOD
   1. define the scientific method.
   2. list the steps of the scientific method.
   3. apply the scientific method in problem solving situations.

II. LABORATORY PROCEDURES
   A. Safety
      1. locate safety equipment within the laboratory.
      2. practice safe working habits within the laboratory.
   B. Lab equipment
      1. identify various lab equipment.
      2. properly use lab equipment.

III. MEASUREMENT
   1. identify metric units of measurement.
   2. make and record observations.
   3. make accurate measurements with different devices.
   4. make calculations and conversions in the metric system.
   5. use significant figures in performing calculations.
   6. recognize and use linear, direct, and inverse variations.

IV. MATTER AND ENERGY
   A. Matter
      1. define matter.
      2. list the three states of matter and give the properties of each state.
      3. define melting, freezing, condensation, sublimation, and vaporization.
      4. state the law of conservation of matter.
      5. distinguish between mass and weight.
      6. define and identify examples of physical and chemical changes.
   B. Energy
      1. define energy.
      2. identify types of energy.
      3. explain the relationship between kinetic and potential energy.
      4. state the law of conservation of energy.
      5. relate the law of conservation of matter to the law of conservation of energy.

V. MACHINES
   1. identify the six simple machines.
   2. define compound machines.
   3. define and compute ideal mechanical advantage.
   4. define and compute actual mechanical advantage.
   5. define and compute input and output work.
   6. identify formulas for work, power, horsepower, and efficiency.
   7. compute work, power, horsepower, and efficiency.

VI. MOTION AND FORCE

1. explain the relationship between force and motion.
2. define speed, velocity, acceleration, distance, momentum, and displacement.
3. illustrate by example the concepts of speed, velocity, acceleration, distance, momentum, and displacement.
4. explain the relationship between mass, velocity, and momentum.
5. demonstrate free fall.
6. explain the forces which act on free fall.
7. define friction and identify ways of overcoming frictional forces.
8. apply equations to compute solutions of problems.
9. apply the various laws of motion.

VII. HEAT AND TEMPERATURE

1. distinguish between heat and temperature.
2. distinguish among Fahrenheit, Celsius, and Kelvin temperature scales.
3. explain the relationship among temperature, pressure, and volume.
4. define conduction, convection, and radiation and explain how heat is transferred by each.
5. explain how energy is absorbed or released as it changes from one state to another.
6. explain and apply the laws of thermodynamics.

VIII. LIGHT AND COLOR

A. Light

1. explain how light is produced and transmitted.
2. define and illustrate reflection and refraction.
3. compare and contrast convex and concave lenses.
4. identify images formed by plane, convex, and concave mirrors.

B. Color

1. locate light and color in the electromagnetic spectrum.
2. identify primary and secondary colors.
3. show how color is produced using primary and secondary colors.
4. explain how white light is produced by using primary and secondary colors of light.
5. define Doppler effect, spectroscope, and color blindness.

IX. ELECTRICITY AND MAGNETISM

A. Electricity

1. compare and contrast positive and negative static electric charges.
2. describe wet and dry cells and explain how cells make up a battery.
3. differentiate between alternating and direct current.
4. define ampere, coulomb, volt, ohm, and watt.
5. define series and parallel circuits.
6. define and describe the function of diodes, anodes, triodes, rectifiers, transistors, and cathodes.
7. define induction and conduction.
8. define resistance.
9. calculate resistance.
10. apply equations to compute solutions of problems.

B. Magnetism

1. list the general properties of magnets.
2. diagram the lines of force around a magnet.
3. explain the relationship between electricity and magnetism.

X. WAVES

1. compare and contrast longitudinal and transverse waves.
2. define wavelength, pitch, frequency, amplitude, and period.
3. diagram and label parts of longitudinal and transverse waves.
4. explain how the transmission of waves is affected by the medium through which the waves travel.
5. use a ripple tank to demonstrate properties of waves.
6. apply equations to compute solutions of problems.

XI. ELEMENTS, COMPOUNDS AND MIXTURES

1. define elements, compounds, and mixtures.
2. differentiate among elements, compounds, and mixtures.
3. identify and define parts of an atom.
4. draw models of atoms depicting numbers of protons, neutron, and electrons.
5. describe the arrangement of the periodic table.
6. distinguish between physical and chemical properties.
7. explain how mixtures and compounds are formed.
8. distinguish among atoms, molecules, and ions.
9. identify the parts of a solution.
10. balance simple chemical equations.
11. distinguish between physical and chemical reactions.

XII. ECOLOGY

1. define ecology.
2. define population, communities, ecosystems, biospheres.
3. describe oxygen cycle.
4. distinguish among producers, primary consumers, secondary consumers, tertiary consumers.
5. define and draw food chains.
6. define ecosystem.
7. compare and contrast open and closed ecosystems.
8. compare and contrast simple and diverse ecosystems.
9. define and identify various sources of pollution.

XIII. GENETICS

1. define genetics.
2. define dominant and recessive traits.
3. define monohybrid and dihybrid.
4. solve problems with monohybrid and dihybrid crosses.
5. explain the contributions of Gregor Mendel to genetics study.

Pendleton High School
and
Tech*Prep*

Pursuing Higher Standards for You!

PENDLETON HIGH SCHOOL
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TECH *PREP*
PREPARATION FOR TECHNOLOGIES

Student and Parent Guide 1990-91

BEST COPY AVAILABLE

Pendleton High School
Post Office Box 218
Pendleton, South Carolina 29670

February, 1990

Dear Students and Parents:

As we look ahead to the decade of the 90's and also to the 21st century, we find ourselves in times of rapid technological change which influences the way we work and live.

In the past, a high school education was enough to prepare young adults for many worthwhile jobs; but, by the year 2000, nearly 14 years of formal education will be needed for most careers. It is critical, therefore, that our students be ready for a more complex world where jobs will require higher levels of mathematical, communications, and problem-solving skills.

Pendleton High School's new Tech Prep program is an important part of our on-going commitment to provide the best high school preparation possible. By combining enhanced academic and career-oriented study in high school, students in the Tech Prep option will be well prepared to pursue postsecondary education at the two-year college level or to enter the workforce following graduation.

Our goal of "pursuing higher standards" is more important than ever as the job market changes with technology, requires more education, and becomes more competitive. We believe that Tech Prep is one way of ensuring that our young people will be ready for rewarding careers in industrial/technical, business, health, public service, and other technology fields.

These are exciting times we live in, and I challenge each student to prepare for the future by building a strong foundation today. Making good choices, working hard, and taking advantage of educational opportunities will help ensure a bright and successful future for all our students.

Sincerely,

Irvin K. Cunningham

Irvin K. Cunningham
Principal

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TECH PREP
PREPARATION FOR TECHNOLOGIES

THE TECH PREP PROGRAM

Tech Prep is an exciting new option for high school students who want to PREPare for careers in TECHnologies. While many states now offer Tech Prep in cooperation with high schools and area community colleges, the program is just beginning in Anderson, Oconee, and Pickens County schools.

Tech Prep involves specific high school courses leading into two-year college occupational programs, which together provide the background and training for rewarding careers in technologies--careers in technical, industrial, business, health, and public service fields.

What Are Tech Prep Courses?

Tech Prep courses include specially-designed courses (such as Principles of Technology); courses that have been enhanced (such as Tech Prep English I - IV and Tech Prep Math I, II, III); and other new or enhanced courses that will be available in coming years. These courses teach skills needed for two-year college occupational programs and for success in the workforce. You learn "how" and "why" mathematics, English, and science skills are used in various careers.

Tech Prep also involves selecting academic courses that will provide important background and preparation to begin career-related postsecondary programs. Today's careers, and the careers of the future, will require strong backgrounds in mathematics, English, and science. Employers in our area tell us that jobs are becoming more technical in nature and that new workers will need better communications and mathematical skills. Tech Prep is designed to give you the skills you need to be successful in a variety of mid-level technology careers---careers that typically require one or two years of college training.

Tech Prep also means taking vocational or occupational courses in high school that provide a "technology base" for college programs in similar areas and that also provide skills needed for entry-level jobs.

Who Should Take The Tech Prep Program?

If you plan to enter a career-oriented program (called an occupational degree program) at a two-year technical college or if you plan to enter the workforce immediately after high school graduation, you should consider taking the Tech Prep program. (If you plan to earn a bachelor's degree from a four-year college or to transfer from either a technical or junior college into a bachelor's degree program, you should take the College Prep program.)

Why Should Students Take Tech Prep?

Tech Prep offers an important option to high school students who want to prepare for good jobs with a promising future. Here are a few reasons why you should take the Tech Prep program in high school:

- Tech Prep leads to jobs with good pay, interesting responsibilities, and opportunities for advancement!
- By the year 2000, the average job in the Southeast will require almost 14 years of formal education!
- Jobs requiring some college education, but less than a four-year college degree, are expanding rapidly in South Carolina! (For example, technician and service jobs requiring college-level education, such as that available through two-year colleges, will increase by 50% in the next decade.)
- Tech Prep helps students save time and money in two-year college programs by ensuring that they have the best preparation in high school.
- Salaries earned by two-year college graduates are, on average, nearly double that of high school graduates who do not have additional training!
- Tech Prep students who complete two-year college programs start their careers with good salaries. (Many start at $20,000 or more!)

Do Tech Prep Classes Affect High School Graduation Requirements?

No! Tech Prep means selecting math, science, and elective courses that meet the requirements for high school graduation and that also provide preparation for future study or work. Graduation requirements are outlined in the Pendleton High School Curriculum Guide for 1990-91.

Are Tech Prep Courses Required For Admission To Two-Year Colleges?

Tech Prep is designed to prepare you for success in two-year colleges, such as Tri-County Technical College, by taking advantage of high school offerings that will provide the necessary skills for college-level occupational programs.

Colleges like Tri-County follow an "open-door" admissions policy which means all who apply are given a chance to pursue higher education. Open-door admission does not mean that the classes are "easier" or that everyone who attends will be able to complete programs successfully. Tech Prep helps you achieve the academic background necessary to avoid taking (and paying for!) college

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classes to build skills that could have been learned in high school. Certain classes considered to be part of the Tech Prep program may be required for admission to specific programs or to colleges other than Tri-County. Admissions requirements are listed in catalogs available from all area two-year colleges.

Can Students Earn College Credit For Taking Tech Prep Courses?

If you take certain vocational or occupational courses in high school, do well in those courses, and successfully complete specific procedures, you may earn Tri-County Technical College credit through a special component of Tech Prep called Technical Advanced Placement. See page 10 of this Guide for more information. (Note: If you plan to enter another area two-year college, you should contact the admissions office of that college to determine advanced placement/college credit opportunities.)

Which Two-Year Colleges Will Tech Prep Prepare Students To Enter?

Tech Prep is designed to prepare you to enter occupational degree programs (programs that prepare two-year college graduates to enter the workforce immediately upon graduation rather than programs designed to transfer to four-year colleges). Tech Prep should give you the academic and vocational background to enter any two-year technical college occupational degree program. **AGAIN, CHECK WITH THE COLLEGE OF YOUR CHOICE TO DETERMINE ADMISSION REQUIREMENTS AND OPPORTUNITIES TO EARN ADVANCED PLACEMENT CREDIT.**

Can Tech Prep Students Enter Four-Year Colleges?

Yes! Even though there are many good careers available today requiring only one or two years of college, you may discover that a four-year college program is really what you want to pursue. If so, talk with your guidance counselor. She may suggest that you change to the College Prep program or she can give you information about transferring from a two-year college to a four-year college or university.

Even if you begin an occupational degree program at a two-year college and then decide to transfer, you still have several options available to transfer successfully. You'll need to discuss your transfer plans with your academic advisor and then check with the transfer admission office of the university to plan to attend.

(There are many benefits to transferring besides saving money--you get a quality education from caring faculty, smaller classes, and you'll get help from a trained academic advisor in understanding exactly what you need to do in order to transfer successfully.)

TECH PREP SUGGESTED COURSE GUIDE

The "Tech Prep Suggested Course Guide" which follows this section and the Technical Advanced Placement (TAP) program relate to programs available at Tri-County Technical College. **YOU SHOULD USE THE INFORMATION PRESENTED HERE ALONG WITH THE 1990-91 CURRICULUM GUIDE TO PLAN YOUR COURSE OF STUDY.**

The information in this guide will help you select courses to prepare for Tri-County Technical College programs. The College programs are listed in groups on the left side (starting on page 5) and the suggested high school math and science courses are listed on the right side of the page. **THE COURSES LISTED ARE SUGGESTIONS, NOT REQUIREMENTS, FOR ADMISSION TO TRI-COUNTY TECHNICAL COLLEGE.** (See the College catalog for admissions procedures and special admission requirements for the Associate Degree Nursing program.)

Because all Tri-County Technical College (TCTC) programs involve study in mathematics, and because some programs are very technical in nature, College Prep math courses are suggested in preparation for CERTAIN programs. These courses are indicated in the guide which follows the section entitled "General Information."

General Information: Described below are some general suggestions and information to help you prepare for postsecondary occupational degree programs.

- **Always take the highest level of course you are capable of handling successfully.** College Prep courses provide excellent preparation whether you are planning to enter two-year or four-year colleges. If you're planning to enter an occupational degree program at a two-year college, such as Tri-County, you may take a combination of Tech Prep and College Prep courses, depending upon the recommendation of your counselor.

- Having a broad background in mathematics will help you be well-prepared for college-level occupational programs. You are strongly encouraged to take a fourth unit of mathematics.

- You should also take a third unit of science, especially to prepare for technical or health programs. (The Course Guide includes a suggested third unit in several cases.)

- You should take at least one computer or keyboarding course.

- You should take vocational or occupational courses, whenever possible, especially if you plan to enter a College program in a similar area. Several courses are suggested in this Guide that would be helpful for certain College majors. (You may qualify to earn Tri-County Technical College credit through the Technical Advanced Placement [TAP] program if you successfully complete specific courses and special requirements. **NOTE: NOT ALL THE SUGGESTED VOCATIONAL COURSES LISTED IN THIS GUIDE QUALIFY FOR TECHNICAL ADVANCED PLACEMENT--SEE PAGE 10 FOR MORE INFORMATION.)**

- The only TCTC program requiring the SAT for admission is the Associate Degree Nursing program. If you're planning to enter this program, you are encouraged to take an SAT preparation course available through most area technical colleges. (Note: Students who enter the Pre-Nursing program may take the SAT after they are enrolled at Tri-County. **THE SAT IS REQUIRED FOR FULL ADMISSION TO THE ASSOCIATE DEGREE NURSING PROGRAM. HOWEVER, THE SAT IS NOT REQUIRED FOR ADMISSION TO PRE-NURSING OR TO ANY OTHER PROGRAM AT TCTC.)**

- Four units of English are required for high school graduation. Tech Prep students may take either Tech Prep English I-IV or College Prep English I-IV. Tech Prep English courses include special units on English skills and concepts used in a variety of careers. Through class exercises, video presentations, and discussions, you will develop effective oral and written communications skills preparing you for postsecondary education or the world of work.

- You should take Principles of Technology as one of your science courses if you are planning to enter the workforce after high school or if you plan to continue your education in an engineering technology, industrial technology or other technically-oriented major. Principles of Technology involves class exercises, hands-on lab experiments, video demonstrations, and class discussions focusing on the concepts of physical science and physics and applications to technology.

Note: Occupational degree programs available at TCTC are listed on the left side of this Course Guide. IF YOU ARE PLANNING TO TRANSFER FROM TRI-COUNTY TO A FOUR-YEAR COLLEGE, YOU SHOULD PLAN TO ENROLL IN THE UNIVERSITY TRANSFER PROGRAM AND TAKE THE SUGGESTED HIGH SCHOOL COURSES LISTED ON PAGE 8.

BUSINESS AND BUSINESS-RELATED PROGRAMS	**MATH (3 UNITS REQUIRED)**	**SCIENCE (2 UNITS REQUIRED)**
Accounting, Computer Technology, Management	T/P MATH I, T/P MATH II, T/P MATH III or ALG I, GEOMETRY OR ALG II	PHYS SCI, PT, STU CHOICE

Suggested vocational/occupational courses: Keyboarding, Introduction to Computers or Business Computer Applications, Accounting I.

SEE PAGE 9 FOR AN EXPLANATION OF COURSE ABBREVIATIONS

NOTE: **Students who do not take the suggested courses or who need to build basic skills for College programs may enter Tri-County Technical College and enroll in developmental studies courses.**

BUSINESS AND BUSINESS-RELATED PROGRAMS	MATH (3 UNITS REQUIRED)	SCIENCE (2 UNITS REQUIRED)
Fashion Merchandising, Radio and TV Broadcasting, Office Systems Technology (Secretarial Science)	T/P MATH I, T/P MATH II, T/P MATH III OR ALG I, ALG II OR BUS MATH	PHYS SCI, PT, STU CHOICE

Suggested vocational/occupational courses: Keyboarding, Introduction to Computers or Business Computer Applications, Clothing and Textiles (for Fashion Merchandising majors); Accounting I and other courses listed in the Curriculum Guide for the Business Education Program (recommended for Office Systems Technology majors).

HEALTH-RELATED PROGRAMS		
Dental Assisting, Medical Lab Technology	T/P MATH I, T/P MATH II, T/P MATH III OR ALG I, ALG II	PHYS SCI, BIO I, CHEM I

Suggested vocational/occupational courses: Keyboarding, Introduction to Computers or Business Computer Applications, Foods and Nutrition.

Nursing (ADN)	PRE-ALG OR ALG I, ALG I OR GEOMETRY, GEOMETRY OR ALG II, ALG II OR PRE-CAL	PHYS SCI, BIO I, CHEM I

Suggested vocational/occupational courses: Keyboarding, Introduction to Computers or Business Computer Applications, Foods and Nutrition.

Practical Nursing, Surgical Technology, Veterinary Technology	T/P MATH I, T/P MATH II, T/P MATH III OR ALG I GEOMETRY OR ALG II	PHYS SCI, BIO I, CHEM I

Suggested vocational/occupational courses: Keyboarding, Introduction to Computers or Business Computer Applications, Foods and Nutrition.

SEE PAGE 9 FOR AN EXPLANATION OF COURSE ABBREVIATIONS

NOTE: **Students who do not take the suggested courses or who need to build basic skills for College programs may enter Tri-County Technical College and enroll in developmental studies courses.**

INDUSTRIAL AND ENGINEERING TECHNOLOGY PROGRAMS	MATH (3 UNITS REQUIRED)	SCIENCE (2 UNITS REQUIRED)
Automated Manufacturing*, Electronics Engineering*, Engineering Graphics*, Quality Assurance */***	PRE-ALG OR ALG I, ALG I OR GEOMETRY, GEOMETRY OR ALG II, ALG II OR PRE-CAL	PHYS SCI, PT, CHEM I
Suggested vocational/occupational courses: Introduction to Computers.		
Automotive** Heating/Ventilation/Air Conditioning, Industrial Electronics, Industrial Mechanics, Machine Tool, Welding	T/P MATH I, T/P MATH II OR PRE-ALG, T/P MATH III OR ALG I, GEOMETRY OR ALG II	PHYS SCI, PT, CHEM I
Suggested vocational/occupational courses: Introduction to Computers, Agricultural Mechanics I/II (for Industrial Mechanics, Welding, HVAC, Industrial Electronics, Machine Tool Technology majors), Auto Mechanics I and II (for Automotive majors).		
Textile Management	T/P MATH I, T/P MATH II OR PRE-ALG, T/P MATH III OR ALG I, GEOMETRY OR ALG II	PHYS SCI, PT, CHEM I
Suggested vocational/occupational courses: Introduction to Computers, Commercial Garment Construction I and II.		

SEE PAGE 9 FOR AN EXPLANATION OF COURSE ABBREVIATIONS

NOTE: **Students who do not take the suggested courses or who need to build basic skills for College programs may enter Tri-County Technical College and enroll in developmental studies courses.**

* These programs are technical in nature and involve study in algebra and trigonometry. High school students are encouraged to have strong backgrounds in mathematics prior to enrolling in these College programs.

** Tri-County Technical College is currently not accepting new students into this program. Plans to reinstate the program are still pending at this time.

*** It is recommended that students planning to enter this program have prior experience in manufacturing or production work of some sort.

PUBLIC SERVICE PROGRAMS	MATH (3 UNITS REQUIRED)	SCIENCE (2 UNITS REQUIRED)
Child Development Assistant, Criminal Justice	T/P MATH I, T/P MATH II, T/P MATH III OR ALG I, ALG II OR BUS MATH	PHYS SCI, BIO I, CHEM I

Suggested vocational/occupational courses: Keyboarding, Introduction to Computers or Business Computer Applications, Child Development (for Child Development Assistant majors)

UNIVERSITY TRANSFER PROGRAMS		
Associate in Arts, Associate in Science	PRE-ALG OR ALG I, ALG I OR GEOMETRY, GEOMETRY OR ALG II, ALG II OR PRE-CAL	PHYS SCI, BIO I, CHEM I, BIO II OR CHEM II OR PHYSICS

Suggested electives: Foreign language, Introduction to Computers, other courses listed as "highly recommended" in the Curriculum Guide for the College Prep Curriculum.

SEE PAGE 9 FOR AN EXPLANATION OF COURSE ABBREVIATIONS

NOTE: **Students who do not take the suggested courses or who need to build basic skills for College programs may enter Tri-County Technical College and enroll in developmental studies courses.**

SUGGESTIONS FOR STUDENTS IN AGRICULTURE AND TRADE AND INDUSTRIES

If you are planning to follow course recommendations for Agriculture or the Trades and Industries programs listed in the Curriculum Guide, you have several options available to you after high school:

- You can enter the workforce directly after high school graduation using the skills you've learned from your vocational program;
- You can continue your education in similar programs at a technical college (ask your guidance counselor to show you which colleges offer majors that would help you build on your vocational training);
- You can continue your education in a Business major at an area technical college (such as Tri-County's Management or Textile Management programs) if you are interested in becoming a manager, eventually opening your own business, or gaining additional skills that would prepare you for a supervisory or management position.

Remember, whatever you plan to do in the future, you'll need strong English and mathematics skills to be successful. Even if you don't plan to go to college, Tech Prep math and English courses will provide you with important academic skills for your career.

EXPLANATION OF COURSE ABBREVIATIONS

Mathematics Courses

ALG I = Algebra I
ALG II = Algebra II
BUS MATH = Business Math
GEOMETRY = Geometry
PRE-ALG = Pre-Algebra
PRE-CAL = Pre-Calculus
T/P MATH I = Tech Prep Math I
T/P MATH II = Tech Prep Math II
T/P MATH III = Tech Prep Math III

Science Courses

BIO I = Biology I
BIO II = Biology II
CHEM I = Chemistry I
CHEM II = Chemistry II
PHYSICS = Physics
PHYS SCI = Physical Science
PT = Principles of Technology
STU CHOICE = Student's Choice

TECHNICAL ADVANCED PLACEMENT

What is Technical Advanced Placement?

Technical Advanced Placement (TAP) is a special part of the Tech Prep program which enables qualified students to earn Tri-County Technical College credit. The purpose of TAP is to:

- reduce overlapping between high school and College programs;
- enable students who do well in high school courses to save time, money, and/or to carry lighter course loads in their first term of studies at Tri-County Technical College.

The procedures that students follow to earn TAP credit are developed by teams of high school and Tri-County Technical College faculty using a process called "articulation." All TAP procedures are fully approved by administrators of Anderson School District Four and Tri-County Technical College.

How Can Students Participate In Technical Advanced Placement?

If you take certain high school courses and complete one or more specific requirements, you will receive TAP credit. In some areas, requirements might be as simple as having your high school teacher submit a recommendation; in other areas, requirements might include taking a TAP exam.

Does It Cost Anything To Participate?

No! There are no charges to participate in the program. In areas that require TAP exams, fees are not required.

Do Students Have To Apply To Tri-County And Be Accepted Before Participating In TAP?

No! Most TAP procedures just require that you be in your senior year in high school.

How Can TAP Credit Be Used?

When you complete all required TAP procedures, you will receive a "Student Course Exemption Form" from Tri-County Technical College. Once you enroll at Tri-County, the credit appears as "exempted credit" on your official college transcript. The credit may be applied to graduation from any Tri-County certificate, diploma, or associate degree program as either a required course or as an elective in an associate degree program (with your department head's approval). If you successfully earn TAP credit for one or more courses you do NOT have to take those courses when you enroll at Tri-County--TAP credit is used just like credit awarded for courses taken on the Tri-County campus.

Can TAP Credit Be Used For Other Colleges?

No! TAP credit is only for students who intend to graduate from one of Tri-County's career (occupational) degree programs. If you intend to transfer from Tri-County to a four-year college, you should not plan to earn credit through TAP. (While it is possible that other colleges would honor courses exempted through TAP, it is not recommended that you use TAP for this purpose.)

Is Technical Advanced Placement Available At Other Colleges?

Many of the area's technical colleges offer similar programs. Each college sets its own program guidelines and requirements, so if you are interested in more information, contact the admissions office of the college you plan to attend. (Students who participate successfully in the College Board's Advanced Placement Program [AP] may qualify for college credit in nearly all area two and four-year colleges.)

In Which Areas Can Students Earn Credit Through TAP?

If you've taken one or more of the courses listed below and you've completed all TAP requirements successfully, you *may* qualify for TAP credit.

- Accounting I*
- Agricultural Mechanics I/II
- Business Computer Applications*
- Child Development*
- Clothing and Textiles*
- Introduction to Computers*
- Keyboarding
- Keyboarding Applications
- Office Supervision and Management
- Shorthand

* TAP procedures are being developed now in these areas. Students who are seniors during 1990-91 *may* be able to participate in TAP for these areas.

Will There Be Other Areas In Which Students Can Earn TAP Credit?

Yes! Over the next few years, students will be able to earn credit in several other subject areas, including academic areas such as English and mathematics! As procedures are developed in these new areas, your guidance counselors will receive updated materials to help you understand all the opportunities available through TAP.

Where Can Students Receive More Information?

See your guidance counselor for a booklet describing Technical Advanced Placement and all the required procedures.

TRI-COUNTY TECHNICAL COLLEGE PROGRAM DESCRIPTIONS

BUSINESS AND BUSINESS-RELATED PROGRAMS

Accounting
Studies traditional and computerized accounting procedures used by junior accountants. (associate degree)

Management
Studies personnel issues, employee motivation, resource maximization, supervision, and areas related to business management. (associate degree)

Computer Technology
Studies business-related programming or data processing used in computer operations centers. (associate degree)

Radio/TV Broadcasting
Studies announcing, directing, studio techniques, interviewing, and technical aspects of broadcasting. (associate degree)

Fashion Merchandising
Studies the fashion industry including basics of retailing, marketing, and buying. (certificate program)

Office Systems Technology/ Secretarial Science
Studies all aspects of the modern office, including typing, word processing, and software packages for information management. (associate degree, diploma, and certificate programs)

HEALTH-RELATED PROGRAMS

Dental Assisting
Studies procedures needed to assist dentists in delivering patient care. (diploma program)

Practical Nursing
Studies methods of patient care, monitoring medical equipment, and performing diagnostic tests--Graduates take the state exam to become licensed practical nurses. (diploma program)

Medical Laboratory Technology
Studies correct methods of performing laboratory tests on blood and other specimens. (associate degree)

Surgical Technology
Studies methods of preparing patients for surgery and assisting the surgeon in the operating room. (diploma program)

Nursing (ADN)
Studies nursing as it relates to direct patient care, counseling, and health education--Graduates take the state exam to become registered nurses. (associate degree)

Veterinary Technology
Studies procedures needed to assist veterinarians with care of large and small animals and methods of conducting clinical tests. (associate degree)

INDUSTRIAL AND ENGINEERING TECHNOLOGY PROGRAMS

Automated Manufacturing
Studies electrical, mechanical, and computer-controlled systems in manufacturing and methods of installing, and troubleshooting these systems. (associate degree)

Automotive Technology
Studies all aspects of automotive repair including computer control systems. **PROGRAM REINSTATEMENT CURRENTLY UNDER CONSIDERATION.** (associate degree)

Electronics Engineering
Studies design, installation, testing, and repairing computers and other digital and microprocessing systems. (associate degree)

INDUSTRIAL AND ENGINEERING TECHNOLOGY PROGRAMS (continued)

Engineering Graphics

Studies drafting and design of mechanical objects in manufacturing and applies principles to traditional drafting techniques and latest CADD/CAM software. (associate degree)

Heating, Ventilation, Air Conditioning

Studies methods of installing and servicing residential and industrial heating and cooling systems. (associate degree)

Industrial Electronics

Studies installation and repair of electrical systems, machinery, and programmable logic controllers used in industry. (associate degree)

Industrial Mechanics

Studies blueprint reading and the installation and maintenance of mechanical, electrical, and heating and cooling systems. (diploma program)

Machine Tool

Studies operation of metalworking equipment, principles of tool and diemaking, and basics of computer numerical control (CNC) and computer-aided manufacturing (CAM) systems. (associate degree)

Quality Assurance

Studies procedures used to set up and operate a total quality control system in a manufacturing environment. (associate degree)

Textile Management

Studies basic operational principles of textile manufacturing and methods of managing personnel in textile industries. (associate degree)

Welding

Studies latest welding techniques and procedures to correctly weld different metals. (diploma program)

PUBLIC SERVICE PROGRAMS

Child Development Assistant

Studies age-appropriate learning activities for preschool children that encourage their physical, intellectual, and social/emotional development. (diploma program)

Criminal Justice

Studies practical and theoretical applications of law enforcement and ways in which social service agencies interact with the criminal justice system. (associate degree)

UNIVERSITY TRANSFER PROGRAMS

Associate in Arts

Provides up to the first two years of a bachelor's degree--Students transfer to four-year colleges and major in education, law, journalism, or other liberal arts fields. (associate degree)

Associate in Science

Provides up to the first two years of a bachelor's degree--Students transfer to four-year colleges and major in engineering, business, computer science, pre-medicine, or other science-related fields. (associate degree)

Mission: Pursuing Higher Standards

The administration, faculty, and staff of Pendleton High School are dedicated to Pursuing Higher Standards in all levels of achievement for all students in our school. We accept the responsibility, individually and collectively, to determine and advance the intellectual, philosophical, social, emotional, and physical potential of each student. We believe that each student has such a potential and that the development of this potential can be measured in our various areas of study and training. We accept the challenge to unlock and develop this potential in each student at Pendleton High School.

In our continuing effort to make Pursuing Higher Standards a reality for our students, we are proud to be one of the first high schools in the three-county area to offer the Tech*Prep program.* Tech*Prep is currently available to high school students in several states and will soon be available to students in all Anderson, Oconee, and Pickens County high schools.*

Tech*Prep programs in the three-county area are being initiated through the Partnership for Academic and Career Education (PACE). The PACE partners include Anderson, Oconee, and Pickens County school districts; local businesses and industries; the National Dropout Prevention Center at Clemson University; and Tri-County Technical College.*

TECH PREP
PREPARATION FOR TECHNOLOGIES

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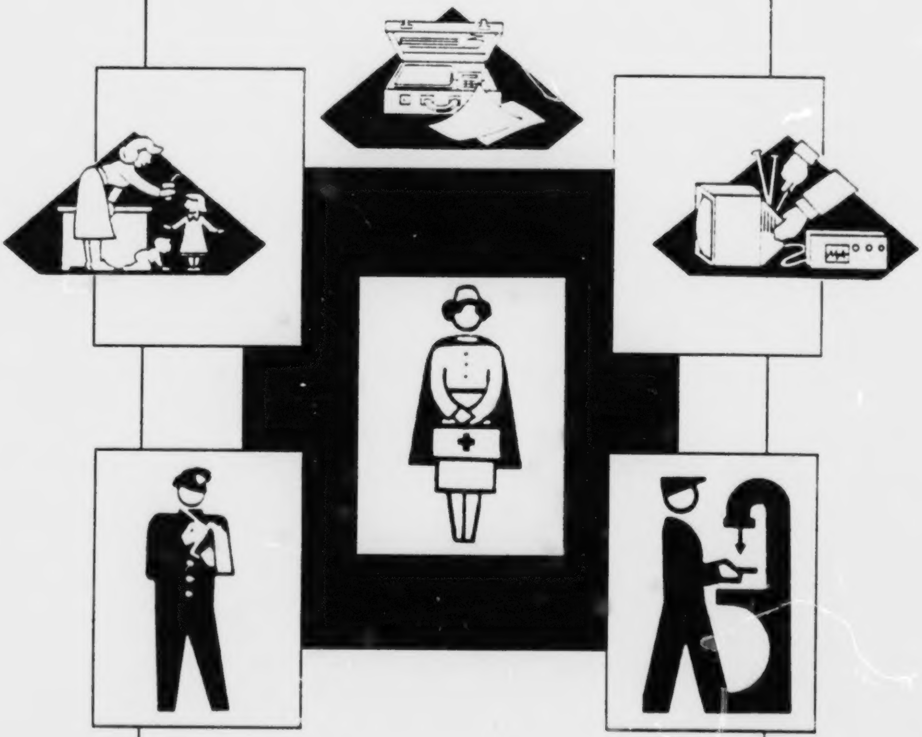
TECH PREP

PREPARATION FOR TECHNOLOGIES

Guide for Students and Parents



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400 Pearman Dairy Road
Post Office Drawer 439
Anderson, South Carolina 29622
(803) 260-5000

An Equal Opportunity Employer

January, 1990

Dear Students and Parents,

In our continuing commitment to educational excellence, Anderson School District Five seeks to offer programs that provide our students with the very best preparation for future study or employment. We are pleased to be among the area's leaders in offering the new Tech Prep program -- a program that emphasizes academic excellence in preparation for many rewarding careers in the industrial/engineering, allied health, business, and public service technologies.

Anderson County has seen tremendous growth in recent years. Many of the jobs available now in our local industries didn't exist even a few years ago. These jobs require greater skills in communications, mathematics, and problem-solving than were needed in the past. In District Five, we know that our students must be better prepared for these new, more technical, and more demanding jobs. Tech Prep will prepare our young people for the training they must have in order to successfully begin their careers and to become the highly-skilled employees that our local business and industries need.

Tech Prep is PREParation for TECHnologies, and it is a program that is being implemented throughout the United States. Within the next few years, Tech Prep will be available to all high school students in Anderson, Oconee, and Pickens counties. In District Five, we are excited to be on the forefront of this movement. We are especially enthusiastic about the opportunities that Tech Prep will bring to our students.

The future success of our students is important to everyone, and that future depends upon the plans and actions of today. I challenge each and every student to plan carefully for the future and to take full advantage of today's opportunities.

Sincerely,

Karen B. Callison

Dr. Karen Callison
Superintendent

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TECH *PREP*
PREPARATION FOR TECHNOLOGIES

THE TECH PREP PROGRAM

Tech Prep is an exciting new option for high school students who want to PREPare for careers in TECHnologies. While many states now offer Tech Prep in cooperation with high schools and area community colleges, the program is just beginning in Anderson, Oconee, and Pickens County schools.

Tech Prep involves specific high school courses leading into two-year college occupational programs, which together provide the background and training for rewarding careers in technologies--careers in technical, industrial, business, allied health, and public service fields.

What Are Tech Prep Courses?

Tech Prep courses include specially-designed courses (such as Principles of Technology now available at McDuffie High School); courses that have been enhanced (such as General English I - IV in all high schools); and other new or enhanced courses that will be included in mathematics, English, and science. These courses teach skills needed for two-year college occupational programs and for success in the workforce. Students learn "how" and "why" mathematics, English, and science skills are used in various careers.

Tech Prep also involves selecting existing academic courses that will provide important background and preparation to begin career-related postsecondary programs. Today's careers, and the careers of the future, will require strong backgrounds in mathematics, English, science. Employers in our area tell us that jobs are becoming more technical in nature and that new workers will need better communications and mathematical skills. Tech Prep is designed to give students the skills they need to be successful in a variety of mid-level technology careers.

Tech Prep also means taking vocational or occupational courses in high school that provide a solid foundation for college programs in related areas and that also provide skills needed for entry-level jobs.

Who Should Take the Tech Prep Program?

Students who plan to enter career-oriented programs (called occupational degree programs) at a two-year technical college or students who plan to enter the workforce immediately after high school graduation should take the Tech Prep program. (Students who plan to earn a bachelor's degree from a four-year college or who plan to transfer from either a technical or junior college into a bachelor's degree program should take the College Prep program.)

Why Should Students Take Tech Prep?

Tech Prep offers an important new option to high school students who want to prepare for good jobs with a promising future. Here are a few reasons why students should take the Tech Prep program in high school:

- Tech Prep leads to jobs with good pay, interesting responsibilities, and opportunities for advancement!
- By the year 2000, the average job in the Southeast will require almost 14 years of formal education!
- Jobs requiring some college education, but less than a four-year college degree, are expanding rapidly in South Carolina! (For example, technician and service jobs requiring college-level education, such as that available through two-year colleges, will increase by 50% in the next decade.)
- Tech Prep helps students save time and money in two-year college programs by ensuring that they have the best preparation in high school.
- Salaries earned by two-year college graduates are, on average, nearly double that of high school graduates who do not have additional training!
- Tech Prep students who complete two-year college programs start their careers with good salaries. (Many start at $20,000 or more!)

Do Tech Prep Classes Affect High School Graduation Requirements?

No! Tech Prep means selecting math, science, and elective courses that meet the requirements for high school graduation and that also provide preparation for future study or work. Graduation requirements are outlined in the curriculum catalogs available for each high school.

Are Tech Prep Courses Required For Admission to Two-Year Colleges?

Tech Prep is designed to PREPare students for success in two-year colleges, such as Tri-County Technical College, by taking advantage of high school offerings that will provide the necessary skills for college-level occupational programs.

Colleges like Tri-County follow an "open-door" admissions policy which means all who apply are given a chance to pursue higher education. Open-door admission does not mean that the classes are "easier" or that everyone who attends will be able to complete programs successfully. Tech Prep helps students achieve the academ background necessary to avoid taking (and paying for!) college

Are Tech Prep Courses Required For Admission to Two-Year Colleges? (continued):

classes to build skills that could have been learned in high school. Certain classes considered to be part of the Tech Prep program may be required for admission to specific programs or to colleges other than Tri-County. Admissions requirements are listed in catalogs available from all area two-year colleges.

Can Students Earn College Credit for Taking Tech Prep Courses?

Students who take certain vocational or occupational courses in high school and who successfully complete specific procedures may earn Tri-County Technical College credit. This opportunity is called Technical Advanced Placement. See page 8 of this Guide for more information. (Note: Students who plan to enter other area two-year colleges should contact the admissions offices of those colleges to determine advanced placement/college credit opportunities.)

Which Two-Year Colleges Will Tech Prep Prepare Students to Enter?

Tech Prep is designed to prepare students to enter occupational degree programs (programs that prepare two-year college graduates to enter the workforce immediately upon graduation rather than programs designed to transfer to four-year colleges). Tech Prep should give students the academic and vocational background to enter any two-year technical college occupational degree program. **STUDENTS SHOULD ALWAYS CHECK WITH THE COLLEGE OF THEIR CHOICE TO DETERMINE ADMISSION REQUIREMENTS AND OPPORTUNITIES TO EARN COLLEGE CREDIT FOR HIGH SCHOOL COURSEWORK.**

The "Tech Prep Suggested Course Guide" which follows this section and the Technical Advanced Placement (TAP) program relate to programs available at Tri-County Technical College.

TECH PREP SUGGESTED COURSE GUIDE

STUDENTS SHOULD USE THE INFORMATION IN THIS GUIDE ALONG WITH THEIR SCHOOL'S CURRICULUM CATALOG TO PLAN COURSES OF STUDY.

The information in this guide will help students select courses to prepare for Tri-County Technical College programs. The College programs are listed in groups on the left side and the suggested high school math and science courses are listed on the right side of the page. (An explanation of the course abbreviations and a brief description of the college programs are described later in this guide.) **THE COURSES LISTED ARE SUGGESTIONS, NOT REQUIREMENTS, FOR ADMISSION TO TRI-COUNTY TECHNICAL COLLEGE.** (See the College catalog for admissions procedures and special admission requirements for the Associate Degree Nursing program.)

Because all Tri-County Technical College (TCTC) programs involve study in mathematics, and because some programs are very technical in nature, it is suggested that students take College Prep math courses in preparation for CERTAIN programs. Those courses are indicated in the guide which follows the section entitled "General Information."

General Information: Described below are some general suggestions and information for students preparing to enter postsecondary occupational degree programs.

- **Students should always take the highest level of course they are capable of handling successfully.** College Prep courses provide excellent preparation for students who are planning to enter either two-year or four-year colleges. Students planning to enter occupational degree programs at two-year colleges, such as Tri-County, may take a combination of Tech Prep and College Prep courses, depending upon recommendation of their counselors.
- Having a broad background in mathematics will help students be well-prepared for college-level occupational programs. Students are strongly encouraged to take a fourth unit of mathematics. (This Course Guide includes a suggested fourth unit shown in parentheses.)
- Students should take a third unit of science, especially to prepare for technical or health programs. (The Course Guide includes a suggested third unit in several cases. This unit is also shown in parentheses.)
- Students should take at least one computer or keyboarding course.
- Students should take vocational or occupational courses, whenever possible, especially if they plan to enter College programs in similar areas. (Students who do well in these courses may earn Tri-County Technical College credit through the Technical Advanced Placement [TAP] program--for more information, see page 8.)
- The only TCTC program that requires the SAT for admission is the Associate Degree Nursing program. Students planning to enter this program are encouraged to take the SAT preparation course available in high school. (Note: Students who enter the pre-nursing program may take the SAT after they are enrolled at Tri-County. **THE SAT IS REQUIRED FOR FULL ADMISSION TO THE ASSOCIATE DEGREE NURSING PROGRAM. HOWEVER, THE SAT IS NOT**

SUGGESTED COURSE GUIDE/GENERAL INFORMATION (continued)

REQUIRED FOR ADMISSION TO PRE-NURSING OR TO ANY OTHER PROGRAM AT TCTC.)

corrected 12/21/89

- Students are also encouraged to take Pre-Vocation courses. These courses provide useful information on different career areas and vocational offerings.
- Students are encouraged to take Industrial Technology. This course provides an excellent introduction to careers in Communication and Media Technology, Construction Technology, Manufacturing Technology, and Transportation/Power and Energy Technology.
- Four units of high school English are required for graduation. Beginning in the 1990-91 school year, **Communications for the Workplace** (Applied Communication), will be offered as an English IV unit. This course will combine a concentrated study of British literature with a curriculum designed to teach necessary communication skills.

NOTE: Occupational degree programs available at TCTC are listed on the left side of this "Course Guide." Students planning to transfer from Tri-County Technical College to a four-year college should plan to enter the University Transfer program and should take high school courses suggested for that program on page 7 of this guide.

Course suggestions are by high school--
H (T.L. Hanna), W (Westside High School), and M (McDuffie High School).
See page 7 for an explanation of course abbreviations.

BUSINESS AND BUSINESS-RELATED PROGRAMS		MATH (3 UNITS REQUIRED)		SCIENCE (2 UNITS REQUIRED)
Accounting, Computer Technology, Management	H/W/M	PRE-ALG,	H/W/M	PHYS SCI,
	H/W/M	ALG I,	H/W	ENV ST OR
	H/W	BUS MATH OR C/MATH		STU CHOICE
	M	GEN MATH III/VOC	M	PT I
	H/W/M	(ALG II) OR	M	(PT II)
	W	(COMPUTER SCI.)		
Fashion Merchandising, Radio and TV Broadcasting, Office Systems Technology/ Secretarial Science	H/W/M	GEN MATH I,	H/W/M	PHYS SCI,
	H/W/M	PRE-ALG,	H/W/M	ENV ST OR
	H/W/M	ALG I		STU CHOICE
	H/W	(BUS MATH)		
	M	(GEN MATH III/CON OR GEN MATH III/VOC)		

Note: **Students who do not take the suggested courses or who need to build basic skills for College programs may enter Tri-County Technical College and enroll in developmental studies courses.**

ALLIED HEALTH PROGRAMS

Dental Assisting, Medical Lab Technology	H/W/M GEN MATH I, H/W/M PRE-ALG, H/W/M ALG I H/W (BUS MATH) M (GEN MATH III/CON OR GEN MATH III/VOC)	H/W/M PHYS SCI, H/W/M GEN BIO OR BIO I H/W/M (CHEM I)
Nursing (ADN)	H/W/M PRE-ALG, H/W/M ALG I, H/W/M GEOMETRY H/W/M (ALG II)	H/W/M PHYS SCI, H/W/M BIO I H/W/M (CHEM I)
Practical Nursing, Surgical Technology, Veterinary Technology	H/W/M GEN MATH I, H/W/M PRE-ALG, H/W/M ALG I H/W/M (GEOMETRY)	H/W/M PHYS SCI, H/W/M GEN BIO OR BIO I H/W/M (CHEM I)

INDUSTRIAL AND ENGINEERING TECHNOLOGY PROGRAMS

Automated Manufacturing*, Electronics Engineering*, Engineering Graphics*, Quality Assurance */***	H/W/M ALG I, H/W/M GEOMETRY, H/W/M ALG II H/W (ALG III/TRIG) M (PRE-CAL)	H/W/M PHYS SCI, H/W CHEM I M PT I M (PT II)
Automotive** Heating/Ventilation/Air Conditioning, Industrial Electronics, Industrial Mechanics, Machine Tool, Welding	H/W/M GEN MATH I, H/W/M PRE-ALG, H/W/M ALG I H/W/M (GEOMETRY OR GEN MATH III/VOC)	H/W/M PHYS SCI H/W ENV STU [illegible] STU CHOICE M PT I M (PT II)
Textile Management	H/W/M GEN MATH I, H/W/M PRE-ALG, H/W/M ALG I H/W (BUS MATH) M (GEN MATH III/CON OR GEN MATH III/VOC)	H/W/M PHYS SCI, H/W ENV STU OR STU CHOICE M PT I M (PT II)

SEE PAGE 7 FOR AN EXPLANATION OF COURSE ABBREVIATIONS

Note: Students who do not take the suggested courses or who need to build basic skills for College programs may enter Tri-County Technical College and enroll in developmental studies courses.

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* These programs are technical in nature and involve study in algebra and trigonometry. High school students are encouraged to have strong backgrounds in mathematics prior to enrolling in these College programs.

** Tri-County Technical College is currently not accepting new students into this program. Plans are to reinstate the program in the fall of 1990.

*** It is recommended that students planning to enter this program have prior experience in manufacturing or production work of some sort.

PUBLIC SERVICE PROGRAMS

Child Development Assistant, Criminal Justice	H/W/M	GEN MATH I,	H/W/M	PHYS SCI,
	H/W/M	PRE-ALG,	H/W/M	GEN BIO OR BIO I
	H/W/M	ALG I		
	H/W	(BUS MATH)		
	M	(GEN MATH III/CON OR GEN MATH III/VOC)		

UNIVERSITY TRANSFER PROGRAMS

Associate in Arts, Associate in Science	H/W/M	ALG I,	H/W/M	PHYS SCI,
	H/W/M	GEOMETRY,	H/W/M	BIO I
	H/W/M	ALG II	H/W/M	(CHEM I)
	H/W	(ALG III/TRIG)		
	M	(PRE-CAL)		

Note: **Students who do not take the suggested courses or who need to build basic skills for College programs may enter Tri-County Technical College and enroll in developmental studies courses.**

EXPLANATION OF COURSE ABBREVIATIONS

Mathematics Courses

ALG I = Algebra I
ALG II = Algebra II
ALG III/TRIG = Algebra III/Trigonometry
BUS MATH = Business Math (TL Hanna and Westside only)
C/MATH = Computer Mathematics (TL Hanna only)
COMPUTER SCIENCE = Computer Science (Westside only)
GEN MATH I = General Mathematics I
GEN MATH III/CON = General Mathematics III/Consumer Math
GEN MATH III/VOC = General Mathematics III/Vocational Math
GEOMETRY = Geometry
PRE-ALG = Pre-Algebra
PRE-CAL = Pre-Calculus (McDuffie only)

Science Courses

BIO I = Biology I
CHEM I = Chemistry I
ENV ST = Environmental Studies
GEN BIO = General Biology
PHYS SCI = Physical Science
PT I = Principles of Technology I (McDuffie only)
PT II = Principles of Technology II (McDuffie only)
STU CHOICE = Student's Choice

TECHNICAL ADVANCED PLACEMENT

What is Technical Advanced Placement?

Technical Advanced Placement (TAP) is a special part of the Tech Prep program which enables qualified students to earn Tri-County Technical College credit. The purpose of TAP is to:

- reduce overlapping between high school and College programs;
- enable students who do well in high school courses to save time, money, and/or to carry lighter course loads in their first term of studies at Tri-County Technical College.

The procedures that students follow to earn TAP credit are developed by teams of high school and Tri-County Technical College faculty using a process called "articulation." All TAP procedures are fully approved by administrators of Anderson School District Five and Tri-County Technical College.

How Can Students Participate In Technical Advanced Placement?

Students who take certain high school courses and complete one or more specific requirements will receive TAP credit. In some areas, requirements might be as simple as having the high school teacher submit a recommendation; in other areas, requirements might include taking a TAP exam.

Does It Cost Anything To Participate?

No! There are no charges to participate in the program. In areas that require TAP exams, fees are not required.

Do Students Have To Apply To Tri-County And Be Accepted Before Participating In TAP?

No! Most TAP procedures just require that the student be in his/her senior year in high school.

How Can TAP Credit Be Used?

Students who complete TAP procedures in one or more areas will receive a "Student Course Exemption Form" from Tri-County Technical College. Once the student enrolls at Tri-County, the credit appears as "exempted credit" on the official transcript. The credit may be applied to graduation from any Tri-County certificate, diploma, or associate degree program as either a required course or as an elective in associate degree programs (with department head's approval). Students who successfully earn TAP credit for one or more

How Can TAP Credit Be Used? (continued)

courses do NOT have to take those courses once they enroll at Tri-County--TAP credit is used just like credit awarded for courses taken on the Tri-County campus.

Can TAP Credit Be Used For Other Colleges?

No! TAP credit is only for students who intend to graduate from one of Tri-County's career (occupational) degree programs. Students who intend to transfer from Tri-County to a four-year college should not plan to earn credit through TAP. (While it is possible that other colleges would honor courses exempted through TAP, it is not recommended that students use TAP for this purpose.)

Is Technical Advanced Placement Available At Other Colleges?

Many of the area's technical colleges offer similar programs. Each college sets its own program guidelines and requirements, so students interested in more information should contact the admissions office of the college they plan to attend. (Students who participate successfully in the College Board's Advanced Placement Program [AP] may qualify for college credit in nearly all area two and four-year colleges.)

In Which Areas Can Students Earn Credit Through TAP?

Students who've taken courses in one or more of the following areas may qualify for TAP credit:

-accounting
-child care/development*
-computer science*
-data processing*
-electronics
-fashion merchandising*
-industrial mechanics
-keyboarding, keyboarding applications, keyboarding production
-machine shop
-marketing/distributive education*
-mechanical drawing
-shorthand
-technical drafting
-typing/typewriting (keyboarding)
-welding
-word processing*

* TAP procedures are being developed now in these areas. Students who are seniors during 1990-91 should be able to participate in TAP for these areas.

Will There Be Other Areas In Which Students Can Earn TAP Credit?

Yes! Over the next few years, students will be able to earn credit in several other subject areas, including academic areas such as English and mathematics! As procedures are developed in these new areas, guidance counselors will receive updated materials to help students understand all opportunities available through TAP.

Where Can Students Receive More Information?

Guidance counselors have booklets available that describe Technical Advanced Placement and all the required procedures.

TRI-COUNTY TECHNICAL COLLEGE PROGRAM DESCRIPTIONS

BUSINESS AND BUSINESS-RELATED PROGRAMS

Accounting
Studies traditional and computerized accounting procedures used by junior accountants. (associate degree)

Computer Technology
Studies business-related programming or data processing used in computer operations centers. (associate degree)

Fashion Merchandising
Studies the fashion industry including basics of retailing, marketing, and buying. (certificate program)

Management
Studies personnel issues, employee motivation, resource maximization, supervision, and areas related to business management. (associate degree)

Radio/TV Broadcasting
Studies announcing, directing, studio techniques, interviewing, and technical aspects of broadcasting. (associate degree)

Office Systems Technology/ Secretarial Science
Studies all aspects of the modern office, including typing, word processing, and software packages for information management. (associate degree, diploma, and certificate programs)

ALLIED HEALTH PROGRAMS

Dental Assisting
Studies procedures needed to assist dentists in delivering patient care. (diploma program)

Medical Laboratory Technology
Studies correct methods of performing laboratory tests on blood and other specimens. (associate degree)

Nursing (ADN)
Studies nursing as it relates to direct patient care, counseling, and health education--Graduates take the state exam to become registered nurses. (associate degree)

Practical Nursing
Studies methods of patient care, monitoring medical equipment, performing diagnostic tests--Graduates take the state exam to become licensed practical nurses. (diploma program)

Surgical Technology
Studies methods of preparing patients for surgery and assisting the surgeon in the operating room. (diploma program)

Veterinary Technology
Studies procedures needed to assist veterinarians with care of large and small animals and methods of conducting clinical tests. (associate degree)

INDUSTRIAL AND ENGINEERING TECHNOLOGY PROGRAMS

Automated Manufacturing
Studies electrical, mechanical, and computer-controlled systems in manufacturing and methods of installing, and troubleshooting these systems. (associate degree)

Automotive Technology
Studies all aspects of automotive repair including computer control systems. **PROGRAM EXPECTED FALL, 1990.** (associate degree)

Electronics Engineering
Studies design, installation, testing, and repairing computers and other digital and microprocessing systems. (associate degree)

INDUSTRIAL AND ENGINEERING TECHNOLOGY PROGRAMS (continued)

Engineering Graphics

Studies drafting and design of mechanical objects in manufacturing and applies principles to traditional drafting techniques and latest CADD/CAM software. (associate degree)

Industrial Mechanics

Studies blueprint reading and the installation and maintenance of mechanical, electrical, and heating and cooling systems. (diploma program)

Textile Management

Studies basic operational principles of textile manufacturing and methods of managing personnel in textile industries. (associate degree)

Heating, Ventilation, Air Conditioning

Studies methods of installing and servicing residential and industrial heating and cooling systems. (associate degree)

Machine Tool

Studies operation of metalworking equipment, principles of tool and diemaking, and basics of computer numerical control (CNC) and computer-aided manufacturing (CAM) systems. (associate degree)

Welding

Studies latest welding techniques and procedures to correctly weld different metals. (diploma program)

Industrial Electronics

Studies installation, and repair of electrical systems, machinery, and programmable logic controllers used in industry. (associate degree)

Quality Assurance

Studies procedures used to set up and operate a total quality control system in a manufacturing environment. (associate degree)

PUBLIC SERVICE PROGRAMS

Child Development Assistant

Studies age-appropriate learning activities for preschool children that encourage their physical, intellectual, and social/emotional development. (diploma program)

Criminal Justice

Studies practical and theoretical applications of law enforcement and ways in which social service agencies interact with the criminal justice system. (associate degree)

UNIVERSITY TRANSFER PROGRAMS

Associate in Arts

Provides up to the first two years of a bachelor's degree--Students transfer to four-year colleges and major in education, law, journalism, or other liberal arts fields. (associate degree)

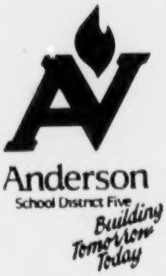
Associate in Science

Provides up to the first two years of a bachelor's degree--Students transfer to four-year colleges and major in engineering, business, computer science, pre-medicine, or other science-related fields. (associate degree)

About Tech Prep...

The administrators, faculty, and staff of McDuffie, T.L. Hanna, and Westside High Schools are pleased that our schools are among the first in our area to offer the Tech Prep program. Tech Prep programs linking high school and community college courses are currently operating in several states across the country. Tech prep will soon be available to students in all Anderson, Oconee, and Pickens County high schools.

Tech Prep programs in the three-county area are being developed in cooperation with the Partnership for Academic and Career Education (PACE), a business-education organization. The PACE partners include Anderson, Oconee, and Pickens County school districts; local businesses and industries; the National Dropout Prevention Center at Clemson University; and Tri-County Technical College.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School District Five
Building Tomorrow Today

T.L. HANNA HIGH

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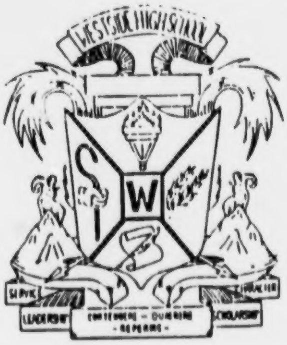
WESTSIDE HIGH SCHOOL
W
SERVICE
CHARACTER
LEADERSHIP
SCHOLARSHIP

Crescent High School

1990-91

CRESCENT
Est. 1956

Course Description Guide

BEST COPY AVAILABLE

Program of Studies
1990-91

Crescent High offers four comprehensive programs of study: the College Preparatory, the Tech-Prep, the Vocational, and the General. All programs require 20 units for a South Carolina high school diploma. The 20 units must be distributed as follows:

English	4 units
U. S. History	1 unit
Economics	1/2 unit
American Government	1/2 unit
Other Social Studies	1 unit
Mathematics	3 units
Natural Science	2 units
Phy. Education/Comprehensive Health	1 unit
Electives	7 units

Minimum diploma requirements DO NOT prepare a student for admission to college.

The responsibility for meeting course and graduation requirements rests with each individual student.

Grade placement is determined by the total number of units a student has earned. The requirements include the following:

10th Grade.....5 units (Must include English I)
11th Grade.....10 units (Must include English I, II and 1 unit of mathematics)
12th Grade.....14 units (Must include English I, II, III and 2 units of mathematics)

All 9th, 10th, 11th and 12th grade students must enroll in at least 5 courses per semester. Any 12th grader not passing BSAP will be required to take 6 units.

Only 1 course in English, new or review, may be taken during the school year. No new basic English course may be taken if a student fails a previous course in English. A failed English course must be repeated and passed in either the regular session or summer school.

According to the Defined Minimum Program for South Carolina schools, a student must attend class a minimum of 170 days in a year course and 85 days in a semester course before receiving credit. This is rigidly enforced.

STUDENTS GRADUATING IN 1990 AND BEYOND MUST BE OFFERED A COURSE IN COMPREHENSIVE HEALTH EDUCATION

In April of 1988, the South Carolina Legislature enacted a landmark decision which requires all public high schools to offer a Comprehensive Health Education course for all high school students. This bill requires Comprehensive Health Education to include community health, consumer health, environmental health, growth and development, nutrition, prevention and control of diseases and disorders, safety and accident prevention, personal health, substance use and abuse, dental health, mental and emotional health, and 750 minutes of reproductive health education, sexually transmitted diseases and pregnancy prevention education.

Reproductive health education instruction includes human physiology, conception, pre-natal care, fetal development, child birth, and post-natal care. Instruction will emphasize abstinence and the risk of sexual activity outside marriage. Sexually transmitted disease education will stress the risk involved in human sexual relationships. Pregnancy prevention education will stress the importance of abstinence from sexual activity until marriage, will explore the skills of handling peer pressure, and will explain the methods and benefits of contraceptives.

These three sex education components of the Comprehensive Health Education bill will be required for all students. Ninth graders will take these components as part of Physical Education I and seniors will take these components in either Sociology or Family Life. However, parents have the option of excluding their child from reproductive health, sexually transmitted diseases, and pregnancy prevention.

Grading Scale at Crescent High School

93 - 100 = A
85 - 92 = B
77 - 84 = C
70 - 76 = D
Below 70 = F

HIGH SCHOOL EXIT EXAMINATION

Students graduating in 1990 and beyond must successfully pass the high school exit examination in order to receive their South Carolina state diploma.

The exit examination shall be in standard written American English and shall consist of subtests in reading, writing, and mathematics based upon the Basic Skills Assessment Program objectives.

To pass the exit examination, each student shall meet the minimum performance standard established by the State Board of Education for each subtest of the exit examination.

A student who is enrolled in the South Carolina public school system for the entire tenth grade year and remains actively enrolled and in good standing until graduation shall have a minimum of four opportunities to pass the examination. The student will take the exam at the end of the tenth grade. If the student does not pass the reading, writing and mathematics tests of the exit exam, he/she will have another opportunity to take the test/tests not passed at the end of the eleventh grade and twice during the twelfth grade.

When a student does not pass the mathematical section of the exit exam and has earned two units of credit in Math Lab, the student shall enroll in remediation Math III and receive no credit for this course. In the next school year, the student will take a non-remediation math course for credit in order to meet the state's requirement of having earned 3 math units.

A student who has 20 credits and does not pass the exit examination shall receive a high school certificate and be eligible to enroll at Crescent in a minimum of four credits per year and take the exit exam each year until age 21 or he/she can choose to enroll in an adult education program and take the exit exam annually.

PARTICIPATION IN HIGH SCHOOL ATHLETICS

Participation in athletics and inter-scholastic activities is governed by the rules of the South Carolina High School League.

Anderson County School District No. 3 does not discriminate on the basis of race, sex, color, religion, national origin, age, handicap, or veteran status in the provision of educational opportunities and benefits, in compliance with Title VII of the Civil Rights Act of 1964, Title IX of the Educational Amendments Act of 1972 and Section 504 of the Rehabilitation Act of 1973. Inquiries and complaints should be directed to Mr. Roy Herron, P. O. Box 118, Iva, S. C. 29655 (phone number: 348-6196)

ADMISSION PREREQUISITES FOR SOUTH CAROLINA COLLEGES AND UNIVERSITIES

Effective in the fall of 1988, all public colleges and universities in South Carolina that grant baccalaureate degrees will adhere to new admission standards which were recommended by the South Carolina Commission on Higher Education. Whether or not these rigorous admission criteria will be accepted by private colleges and/or universities was undetermined at the time this course description guide was printed. Schools at which this will be in effect are: The Citadel, Clemson, College of Charleston, Frances Marion, Lander, South Carolina State, U.S.C. - all branches, and Winthrop.

Area:	Units:
English	4: at least two having strong grammar and composition components, at least one in English literature, and at least one in American literature (Completion of college preparatory English I, II, III, & IV will meet these requirements.)
Mathematics	3: including Algebra I & II; Geometry is strongly recommended as the required third unit and a fourth unit is recommended but not required.
Laboratory Science	2: at least one unit each of two laboratory sciences chosen from biology, chemistry, or physics. A third unit of a laboratory science is strongly recommended.
Foreign Language	2: two units of the same foreign language.
Other	1: one unit of advanced mathematics or computer science or a combination of these; or one unit of World History, World Geography, or Western Civilization.
U.S. History	1
Economics	1/2
Government	1/2
Additional Social Studies	1
Phy. Education or ROTC	1

Gifted and Talented Program - A.P.P.L.E. III/Honors
(Advanced Pupils Pursuing Learning Experiences)

Recommended courses for current 10th and 11th graders:

9th Grade	10th Grade	11th Grade	12th Grade
English I (H)	English II (H)	English III (H)	AP English
Algebra II (H)	Geometry (H)	Alg/Trig. (H)	AP Calculus
Phys. Sci. (H)	Biology (H)	Chemistry (H)	Physics
World History (H)	U. S. History (CP)	AP U.S. History	Spanish III
P.E. I	Foreign Lang. I	Foreign Lang. II	Gov.\Econ.CP
Elective	Elective	Elective	Elective

Recommended courses for current 9th graders and students beginning high school in the 1990-91 academic school year:

9th Grade	10th Grade	11th Grade	12th Grade
English I (H)	English II (H)	English III (H)	AP English
Algebra II (H)	Geometry (H)	Alg/Trig (H)	AP Calculus
Biology I (H)	Chemistry (H)	AP U.S. History	Physics
World History (H)	U.S. History (CP)	Foreign Lang. II	Spanish III
Elective	Foreign Lang.I	Elective	Gov/Econ CP
P.E. I	Elective	Elective	Elective

A.P.P.L.E. III/Honors Program is a program for academically gifted students which provides differentiation courses in Language Arts, Social Studies, Math, and Science for eligible students. In order to qualify for A.P.P.L.E. III/Honors Program, a student must be identified as academically gifted in accordance with regulations of the State of South Carolina. Decisions about placement of students in specified courses are made by the A.P.P.L.E. III/Honors Evaluation and Placement Committee. Nomination forms for A.P.P.L.E. III/Honors may be obtained from the school guidance department.

Advanced Placement Courses These courses are for academically superior students at Crescent. In order to be eligible for these courses, a student must score at the 90% or above on the appropriate subject area of the CTBS test and have at least a "B" average in the appropriate college preparatory subjects or be recommended by the Guidance Department. To enroll, please see your guidance counselor.

THE COLLEGE PREPARATORY PROGRAM

The College Preparatory Program is for students who plan to attend a two or four year college. The purpose of this program is to give a student a broad subject matter background. It is designed for not only those students who plan to enter vocations of medicine, engineering, architecture, etc., but also those students who choose fields of education, law, business administration or hundreds of other areas. It is the school's belief that sequential study in this area will provide a broad base for future study in college.

Suggested program of study to prepare for college admission:

9th Grade	10th Grade	11th Grade	12th Grade
English I CP	English II CP	English III CP	Adv. Comp
Algebra I or II	Geometry	Algebra II or	or AP English*
Phys. Science	Biology CP	Algebra-Trig.	Alg/Trig. or
Phys. Ed. I	Foreign Lang II	Chemistry	Calculus CP or
Foreign Lang I	World Hist. CP	U.S. Hist. CP	AP Calculus*
World Geo. CP	Elective	Gov./Econ. CP	Physics
		Elective	AP U.S. History

* Requires 90% score on the CTBS test and a "B" average.
P. E. is a required course and must be taken prior to graduation.

Recommended Testing Sequence for College Admission:

10th Grade - PSAT - October
11th Grade - PSAT - October
11th Grade - SAT - May or June
12th Grade - SAT - October/November

No student should take the college board tests unless he/she has had the college preparatory course work.

Recommendation for College:

To meet entrance requirements of most four-year colleges, students need to maintain a grade point average of 2.0 or higher in prescribed programs of study. College catalogs should be consulted in planning these programs.

Foreign Language: In order to be in the college preparatory curriculum, a student must have completed two years of the same foreign language.

Class Rank: Class rank is one of the most important factors determining college admission. The first rank will be computed using the final grade in each course in the 9th grade. Subsequent ranks will be computed at the end of the 10th and 11th grade years. Final rank will be computed at the end of 3rd nine weeks of the senior year to determine valedictorian and salutatorian. Junior Marshals and Honor Graduates are chosen based on a 3.5 or higher grade point average.

The class rank will be reported to colleges using a Grade Point Ratio. On the next page is a table showing the procedure for calculating class rank and an explanation of this procedure:

COURSE WEIGHTING

The weight to be added to points assigned to the course grade for the purpose of determining class rank in College Board Advanced Placement Courses and Honors Courses is .0754. The weight to be added to points assigned to the course grade for the purpose of determining class rank in College Preparatory Courses is .0377. The final numerical grade below 77 in Advanced Placement, Honors and College Preparatory Courses will not have a factor added for determining class rank.

The following G.P.R. will be used for reporting class rank to colleges:

SCALE	GRADE	General/ Basic G.P.R.	Weighted College Prep G.P.R.	Weighted Honors & AP G.P.R.
98-100	A +	4.50	4.77	5.12
95-97	A	4.25	4.50	4.84
93-94	A -	4.00	4.29	4.56
90-92	B +	3.50	4.00	4.28
87-89	B	3.25	3.50	4.00
85-86	B -	3.00	3.25	3.50
82-84	C +	2.50	3.0	3.25
79-81	C	2.25	2.50	3.00
77-78	C -	2.00	2.25	2.50
75-76	D +	1.50	1.50	1.50
70-74	D	1.00	1.00	1.00

The weighting of final course grades will be utilized to determine the class rank for students. Weighting of final course grades should be limited to the following courses:

Weighted Honors & AP Courses

College Board Advanced Placement Courses
Honors English I, II, III
Honors Algebra I, II, III (Trig)
Honors Geometry
Honors Physical Science
Honors Biology
Honors Chemistry
Honors World History

Weighted College Preparatory Courses

College Prep English I, II, III, IV
Algebra I, II, III (Trig)
Calculus, Geometry
French I, II
Spanish I, II. III
College Prep Physical Science
College Prep Biology
College Prep Chemistry
College Prep Physics
College Prep World History
College Prep World Geography
College Prep Govt/Economics
College Prep U.S. History
Japanese I, II
Russian I, II

The GENERAL PROGRAM

The General Program is for those students who are still undecided about future plans or who do not desire to complete College Preparatory or Business Education Programs. It is desirable that some orderly sequence of courses be followed in planning each individual's program. Generally, the scope of this program should give a student the tools for immediate entry into the world of work and community living.

The recommended program follows:

9th Grade	10th Grade	11th Grade	12th Grade
Eng. I Gen	Eng. II Gen	Eng. III Gen	Eng. IV Gen
Math I	Math II	Math III	Elective
Gen. Science	General Biology	U.S. Hist Gen.	Elective
Soc. Studies	Elective	Gov./Econ.	Elective
P.E. I	Elective	Elective	Elective
Elective	Elective	Elective	Elective

Home Economics Courses

The physical, social, economic, and cultural needs of individuals and families form the foundation of the consumer and homemaking courses. Instruction focuses on preparation for the occupation of homemaking and the management of the dual roles of the homemaker and wage earner. Organized instruction and laboratory experiences emphasize the development of knowledge and understanding of attitudes and skills relevant to personal, home and family life responsibilities. Consumer homemaking is not an occupation vocational program.

Prevocation is not an occupation vocational program.

THE VOCATIONAL OCCUPATIONAL PROGRAMS

Business Education Program

The Business Education Program is designed to prepare students for a variety of careers. This program can be for the student who plans to pursue a career in business immediately after graduation from high school, as well as the professionally-minded student eager for a full degree program.

Suggested program of study to prepare for the world of work, technical school, business school, etc.:

9th Grade	10th Grade	11th Grade	12th Grade
Eng. I Gen	Eng. II Gen	T-Prep Eng. III	T-Prep Eng. IV
Math I	Math II	Math III	Gov./Econ
T-Prep Sci. or Gen. Sci.	T-Prep.Bio. or Gen. Biology	U.S. History	Acct. II
P.E. I	Typing I	Word Processing	Bus. Law
Social Studies	Electives	Comp. Literacy	Off. Pro.
		Accounting I	Typing II
		Shorthand I or Elective	Shorthand II or Elective

A student may major in any of three areas of Business Education. The three areas are listed below along with the courses (3) the student is required to take in order to receive a certificate of completion in that area.

Clerical Major	Stenographic Major	Accounting Major
Typing I	Typing I	Intro. to Bus.
Typing II	Typing II	Business Law
Data Pro./Off. Mach.	Shorthand I	Accounting I
Intro. to Bus.	Shorthand II	Accounting II
Office Procedures	Introduction to Business	Typing I
Word Processing	Word Processing	Word Processing
Intro. to Comp.	Comp. Literacy	Comp. Literacy
	Data Pro/Off Mach or Office Procedures	

Suggested program of study to prepare for college degree programs in accounting, marketing, personnel administration, banking, insurance, brokerage, purchasing, or administrative management:

9th Grade	10th Grade	11th Grade	12th Grade
Eng. I CP	Eng. II CP	Eng. III CP	Adv. Comp.
Algebra I	Geometry	Algebra II	Alg./Trig
Phys. Science	Biology CP	U. S. Hist. CP	Gov./Econ. CP
World Geo. CP	Foreign Lang. I	Foreign Lang. II	Acct. II
P.E. I	Typing I	Typing II	Bus. Law
Elective	Elective	Accounting I	Chemistry

The Vocational Agricultural Program

Vocational education in agriculture is an integral part of the public school program in South Carolina. The function is to educate students in the science of modern agricultural production and agricultural occupations. Vocational agriculture has the responsibility of training high school students and adults for employment in the vast area of agricultural business. Any student 14 years of age or older interested in the broad field of agriculture can elect to enroll in a vocational agriculture course.

The Future Farmers of America is a volunteer organization of students studying vocational agriculture in public high schools. It is designed to supplement the regular instruction by providing opportunities for training in leadership, cooperation and citizenship.

The recommended program follows the Tech-Prep curriculum with the inclusion of the following agriculture courses as electives:

9th Grade	10th Grade	11th Grade	12th Grade
Ag. Science	Ag. Production	Ag. Mechanics or Ag. Livestock	Forestry

The Electronics Program

Electronics I (2 units)
Prerequisite: Math II or Algebra I or Geometry

Electronics I is a highly technical instruction program that introduces the student to the basic fundamentals of an advanced electronics program. This program will prepare the student to a assemble, install, operate, trouble shoot, and maintain electrical electronic equipment used in business and industry. All students enrolled in this program are encouraged to pursue further education in a technical institution upon graduation. Students will be selected for this program based upon grades, attendance and standardized test scores.

Electronics II (3 units)
Prerequisite: Electronics I

The Electronics II program is an extension of the Electronics I program. Electronics II will deal with a more advanced program of study in the electronics field. This program will teach the student to analyze, troubleshoot and repair various specialized electronic circuitry. Upon completion of the two-year electronics program, the student will be able to enter a technical institution with possible exemption from some of the basic programs of instruction.
The recommended program follows the Tech Prep curriculum:

9th Grade	10th Grade	11th Grade	12th Grade
T-Prep Sci. Math I or Pre-Algebra	T-Prep Phys. Sci. Pre-Alg or Applied Math II or Alg. I	Electronics I Applied Math III or Alg. II Princ. of Technology	Electronics II Geometry

The Health Occupations Program

Health Occupations Education I & II is a program designed to introduce the students to the world of health care. Health Occupations Education I was implemented in the 1987-88 school year. Health Occupations Education II was implemented in the 1988-89 academic school year. To receive the full benefits of this program, students need to successfully complete Health Occupations I & II.

Health Occupations Education I (2 units credit)
This two hour course is designed for eleventh graders. This course introduces the students to the health care industry. Areas explored include nursing, physical therapy, dietary services, dental care, x-ray technology, pharmacy and laboratory procedures. The course is taught through a classroom lecture/laboratory approach.

Health Occupations Education II (3 units credit)
This three hour course is designed for second year twelfth grade students. The course prepares students to seek employment at the technician and/or assistant level by expanding the basic skills and knowledge acquired in the first year course through on-the-job training in local hospitals, extended care facilities, clinics, and doctors' offices. Emphasis is placed on expanding and refining the performance skills, related theory, and leadership qualities which have been developed and are expected of an entry level employee or graduate seeking further education at the post-secondary level.

The recommended program follows the general curriculum with the exception of the science courses which are listed below:

9th Grade	10th Grade	11th Grade	12th Grade
Tech Prep Sci.	Tech Prep Biology	Phy. Sci. CP	Chemistry

OR

Phy. Sci. CP	Biology I CP	Chemistry	
		Health Occ. I	Health Occ. II

The Tech-Prep Program

Crescent High School is offering the Tech Prep program designed to **PREP**are students for **TECH**nologies. The program involves specific high school courses leading into two-year technical college programs, which together provide the background and training for rewarding careers in technologies--careers in technical, industrial, business, allied health, and public service fields.

WHAT ARE TECH PREP COURSES?

Tech Prep courses include specially designed courses such as Principles of Technology, Applied Vocational Mathematics, and Tech-Prep English. These specially designed courses teach skills needed for two-year technical college programs and for success in the workforce. Students learn "how" and "why" mathematics, English, and science concepts are used in various careers.

Tech Prep also involves selecting existing academic courses at Crescent that will provide important background and preparation to begin career-related programs in technical colleges. Today's careers, and the careers of the future, will require strong backgrounds in mathematics, English, and science. Employers in our area tell us that jobs are becoming more technical in nature, and that new workers will need better communication and computational skills. Tech Prep is designed to give students the skills they need to be successful in a variety of careers.

Tech Prep also means taking vocational or occupational courses in high school that give students a solid foundation for college programs in related areas as well as skills needed for entry-level jobs.

The suggested course of study for students who plan to attend a technical school and pursue an Associate Degree (2-year) after graduation is as follows:

9th Grade	10th Grade
Gen. English I	Gen. English II
Pre-Algebra	Applied Math II or Algebra I
Tech Prep Science	Physical Science

11th grade	12th Grade
Tech-Prep English III	Tech-Prep English IV
Applied Math III or Algebra II	Geometry
Principles of Technology	Chemistry

* Students in Health Occupations should follow the suggested program of studies.

WHO SHOULD TAKE THE TECH PREP PROGRAM?

Students who plan to enter career-oriented degree programs at a two-year technical college or students who plan to enter the workforce immediately after high school graduation should take the Tech Prep program. Students who plan to earn a bachelor degree from a 4-year college or who plan to transfer from a technical college into a bachelor's degree program should take the College Prep program.

DOES TAKING TECH PREP CLASSES AFFECT HIGH SCHOOL GRADUATION REQUIREMENTS?

NO! Tech Prep means selecting math, science, and elective courses that meet the requirements for high school graduation and that also provide preparation for future study or work. Graduation requirements are outlined in the beginning of this guide.

CAN STUDENTS EARN COLLEGE CREDIT FOR TAKING TECH PREP COURSES?

Students who take certain vocational or occupational courses in high school and who successfully complete specific procedures may earn Tri-County Technical College credit. This opportunity is called Technical Advanced Placement.

WHICH TWO-YEAR COLLEGE WILL TECH PREP PREPARE STUDENTS TO ENTER?

Tech Prep is designed to prepare students to enter occupational degree programs (programs that prepare two-year college graduates to enter the workforce immediately upon graduation rather than programs designed to transfer to four-year colleges). Tech Prep should give students the academic and vocational background to enter any two-year technical college occupational degree program. Students should always check with the college of their choice to determine admission requirements and advanced placement opportunities. The "Tech Prep Suggested Course Guide" which follows this section and the Technical Advanced Placement (TAP)) program relate to programs available at Tri-County Technical College.

GENERAL INFORMATION

Students can increase their preparation to enter and be successful in college programs if they follow these suggestions:

- Take as much mathematics as possible in all four years of high school for the broadest background that can be handled successfully.
- Take at least one computer course (mathematics and computer skills are important for every college program).
- English skills are also important in college programs (and really important for job success!).
- Students planning to enter college programs in business-related majors, health, or electronics should also take as many vocational/occupational courses as possible

"Tech-Prep Suggested Course Guide"

Students interested in attending a technical school and pursuing an Associate Degree (2-year degree) after graduation and who are interested in any of the following areas should select the Tech-Prep Program:

BUSINESS AND BUSINESS-RELATED PROGRAMS

Accounting, Computer Technology, Business Management
Fashion Merchandising
Radio and TV Broadcasting
Secretarial Science/Office Systems Technology

ALLIED HEALTH PROGRAM

Dental Assisting
Medical Lab Technology
Nursing
Practical Nursing
Surgical Technology
Veterinary Technology

INDUSTRIAL AND ENGINEERING TECHNOLOGY PROGRAMS

Automotive
Heating/Ventilation/Air Conditioning
Industrial Electronics
Industrial Mechanics
Machine Tool
Welding
Textile Management

PUBLIC SERVICE PROGRAMS

Child Development Assistant
Criminal Justice

UNIVERSITY TRANSFER PROGRAMS, AUTOMATED MANUFACTURING, ELECTRONICS ENGINEERING, ENGINEERING GRAPHICS, QUALITY ASSURANCE

Students interested in pursuing the above mentioned areas need to enroll in the College Prep curriculum.

PROGRAM DESCRIPTIONS

BUSINESS AND BUSINESS-RELATED PROGRAMS:

Accounting
Studies traditional and computerized accounting procedures used by junior accountants. (associate degree)

Management
Studies personnel issues, employee motivation, maximizing resources, supervision and areas related to business management. (associate degree)

Computer Technology
Studies business-related programming or data processing used in computer operations centers. (associate degree)

Radio/TV Broadcasting
Studies announcing, directing, studio techniques, interviewing, and technical aspects of broadcasting. (associate degree)

Fashion Merchandising
Studies the fashion industry including basics of retailing, marketing, and buying. (certificate program)

Secretarial Science/Office Systems Technology
Studies all aspects of the modern office including typing, word processing, software packages for information management. (associate degree, diploma, and certificate programs)

ALLIED HEALTH PROGRAMS:

Dental Assisting
Studies procedures needed to assist dentists in delivering patient care. (diploma program)

Practical Nursing
Studies methods of patient care, monitoring medical equipment, performing diagnostic tests. Graduates take the state exam to become licensed practical nurses. (diploma program)

Medical Laboratory Technology
Studies correct methods of performing laboratory tests on blood and other specimens. (associate degree)

Surgical Technology
Studies methods of preparing patients for surgery and assisting surgeon in the operating room. (diploma program)

Nursing (ADN)
Studies nursing as it relates to direct patient care, counseling, and health education. Graduates take the state exam to become registered nurses. (associate degree)

Veterinary Technology
Studies procedures needed to assist veterinarians with care of large and small animals and methods of conducting clinical tests. (associate degree)

INDUSTRIAL AND ENGINEERING TECHNOLOGY PROGRAMS:

Automated Manufacturing

Studies electrical, mechanical, and computer-controlled systems in manufacturing and methods of installing, troubleshooting these systems.
(associate degree)

Automotive Technology

Studies all aspects of automotive repair including computer control systems.
(associate degree)

Electronics Engineering

Studies design, installation testing, repairing computers and other digital and microprocessing systems.
(associate degree)

Engineering Graphics

Studies drafting and design of mechanical objects in manufacturing and applies principles to traditional drafting techniques and latest CADD/CAM software.
(associate degree)

Heating, Ventilation, Air Conditioning

Studies methods of installing and servicing residential and industrial heating and cooling systems.
(associate degree)

Industrial Electronics

Studies installation, repair of electrical systems, machinery and programmable logic controllers used in industry.
(associate degree)

Industrial Mechanics

Studies blueprint reading and how to install, maintain mechanical, electrical, and heating and cooling systems.
(diploma program)

Machine Tool

Studies operation of metalworking equipment, principles of tool and diemaking, and basics of computer numerical control (CNC) and computer-aided manufacturing (CAM) systems. (associate degree)

Quality Assurance

Studies procedures used to set up and operate a total quality control system in a manufacturing environment.
(associate degree)

Textile Management

Studies basic operational principles of textile manufacturing and methods of managing personnel in textile industries.
(associate degree)

Welding

Studies latest welding techniques and procedures to correctly weld different metals.
(diploma program)

PUBLIC SERVICE PROGRAMS:

Child Development Assistant

Studies age-appropriate learning activities for preschool children that encourage their physical, intellectual, and social/emotional development.
(diploma program)

Criminal Justice

Studies practical and theoretical applications of law enforcement and ways in which social service agencies interact with the criminal justice system.
(associate degree)

UNIVERSITY TRANSFER PROGRAMS:

Associate in Arts

Provides up to the first two years of a bachelor's degree. Students transfer to a four-year college and major in education, law, journalism, or other liberal arts fields. (associate degree)

Associate in Science

Provides up to the first two years of a bachelor's degree. Students transfer to four-year colleges and major in engineering, business, computer science, pre-medicine or other science-related fields.

ABOUT TECH PREP...

The administration, faculty, and staff of Crescent High School are pleased that our school is one of the first in our area to offer the Tech Prep Program. Tech Prep programs, linking high school and community college courses, are currently operating in several states across the country. Tech Prep will soon be available to students in all Anderson, Oconee, and Pickens County high schools.

Tech Prep programs in the three-county area are being initiated through the Partnership for Academic and Career Education (PACE). The PACE partners include Anderson, Oconee, and Pickens County school districts; local businesses and industries; the National Dropout Prevention Center at Clemson University; and Tri-County Technical College.

ENGLISH READING LIST

Grade Nine

* Great Expectations or
A Tale of Two Cities
Silas Marner
Adventures of Tom Sawyer
Wuthering Heights
* Animal Farm
The Good Earth
Lilies of the Field
* Edith Hamilton's Mythology
A Patch of Blue
The Old Man and the Sea
Joseph Andrews
The Trial
The Third Man
Portrait of Dorian Gray
Lucky Jim
Fathers and Sons

Grade Ten

Jane Eyre
* The Pearl
Watership Down
* Lord of the Flies
* A Separate Peace
The Prince and the Pauper
Flowers for Algernon
The Heart Is a Lonely Hunter
* The Red Badge of Courage
Billy Budd
Ethan Frome
Our Town
One Flew over the Cuckoo's Nest
Hard Times
Native Son

Grade Eleven

A Connecticut Yankee in King
Arthur's Court
The Last of the Mohicans
Raisin in the Sun
* The Glass Menagerie
* The Scarlet Letter
Great Gatsby
* Moby Dick
A Farewell to Arms
* Huckleberry Finn
The Sound and the Fury
Hamlet
The Grapes of Wrath
As I Lay Dying

Grade Twelve

* Of Mice and Men
Of Human Bondage
To Kill a Mockingbird
Catcher in the Rye
The Hobbit
Heart of Darkness/Secret Sharer
The Stranger
* Iliad or Odyssey
The Return of the Native
Madame Bovary
Jude the Obscure
1984
Pride and Prejudice
Pilgrim's Progress
J. B.
Rosencrantz & Guildenstein Are
Dead
Waiting for Godot
King Lear
* The Portrait of the Artist as
a Young Man

* indicates the material should be included in Honors/AP

ENGLISH DESCRIPTIONS

In an attempt to meet the needs of our students, English courses are divided into four levels. Developmental English is designed for those students who have been identified, from test scores, as needing special help in the area of reading - a vital skill for everyone.. General English is designed for those students who do not plan to further their education beyond the high school level with the exception of trade or vocational studies like auto mechanics, masonry, and cosmetology. Tech-Prep courses are designed for students who plan to attend a technical school (with the exception of students who plan to enter a college transfer program). College preparatory courses are designed for those who do plan to continue their education beyond the high school level at junior colleges, universities, or technical schools if the students plan to enter a college transfer program. Finally, Honors is a program for academically gifted students in social studies, language arts, and science. Students are identified through the state testing criteria.

It is the parents' responsibility to review the book list of reading in English to determine if there is any reading material that would be offensive. If you find any of the reading material offensive, please register your complaint in writing to the principal.

English I (100) - Developmental (1 unit)

Placement in developmental English is determined by BSAP and CTBS scores. Concentration in this course is upon developmental reading skills, basic sentence construction, and simple paragraph writing.

English I (101) - General (1 unit)

This course is designed for students who do not plan to further their educations beyond the high school level. Concentration in this course will be upon developmental reading skills, basic sentence construction, and simple paragraph writing.

English I (104) - College Preparatory (1 unit)

This course is designed for students who plan to further their education beyond high school. Advanced reading skills, vocabulary development, and narrative, descriptive, and expository paragraph writing will be emphasized. A minimum of four parallel readings from the English I reading list will be required. Students will be responsible for obtaining these parallel reading materials.

English I (105) - Gifted & Talented - A.P.P.L.E. III/Honors (1 unit)

Placement in honors English will be determined by test scores and state standards. Concentration will be upon advanced reading skills, vocabulary development, creative expression, and narrative, descriptive, and expository paragraph writing. Six parallel readings from the English I reading list will be required. Students will be responsible for obtaining these parallel reading materials.

English II (110) - Developmental (1 unit)

Prerequisite: English I

This course continues a concentration on developmental reading skills, basic sentence construction, and simple paragraph writing which will emphasize narration and description.

English II (111) - General (1 unit)

Prerequisite: English I

This course is designed for a student who does not plan to further his/her education beyond the high school level. The course continues a concentration on developmental reading skills, basic sentence construction, and simple paragraph writing which will emphasize narration and description.

English II (114) - College Preparatory (1 unit)

Prerequisite: English I CP

This course is for students who plan to continue their education beyond the high school level. Advanced reading skills, vocabulary development, and paragraph writing (narrative, descriptive, expository, and persuasive) will be stressed. Research skills will be introduced with emphasis upon compiling a working bibliography. A minimum of six parallels from the English II reading list will be required. Students will be responsible for obtaining these parallel reading materials.

English II (115) - Gifted & Talented - A.P.P.L.E. III/Honors (1 unit)

Prerequisite: English I Gifted & Talented

This course continues concentration on advanced reading skills, vocabulary development, paragraph writing (narrative, descriptive, expository, and persuasive), creative expression, and literary analysis with emphasis on American literature. Techniques in oral expression will also be explored. Research skills will be introduced, and a research project will focus on career planning. A minimum of six parallel readings from the English II reading list will be required. Students will be responsible for obtaining these parallel reading materials. Students will also compile and edit Our Times, Crescent's literary magazine.

English III - (120) Developmental (1 unit)

Prerequisite: English II

This course continues concentration on developmental reading skills, sentence construction, and paragraph writing (persuasive, expository, narrative and descriptive). Job hunting activities and related communication skills will be stressed. A general overview of reference and resource materials will be included.

English III - (121) General (1 unit)

Prerequisite: English II

This course is designed for students who do not plan to further their education beyond the high school level. A concentration on developmental reading skills, sentence construction, and paragraph writing (narrative, descriptive, expository, and persuasive) continues. This course will include job hunting activities and related communication skills. Also included will be a general overview of reference and resource materials.

Tech-Prep English III - (122) (1 unit)
Prerequisite: English II
This course is designed for students who plan to further their education in a technical college or enter employment immediately after graduation. The course will emphasize oral and written communication with other employees and supervisors in the workplace. The student will develop skills in how to communicate in an interview, how to give directions to others, how to listen effectively, and how to respond to the supervisor. Also included will be reading and understanding literature.

English III - (124) College Preparatory (1 unit)
Prerequisite: English II CP
This course is designed for students who plan to continue their education beyond the high school level. Concentration on advanced reading skills with an emphasis upon American literature continues. Writing will be expanded to include essays and literary analyses. Vocabulary development will continue to be emphasized. Research skills will include the writing of a term paper. Techniques in oral expression will also be explored. A minimum of six parallel readings will be required from the English III reading list. Students will be responsible for obtaining these parallel reading materials.

English III - (125) Gifted & Talented - A.P.P.L.E. III/Honors (1 unit)
Prerequisite: English II Gifted & Talented.
This course continues concentration on advanced reading skills with emphasis on the study of British literature. Writing will be expanded to include essays. Creative expression and literary analyses will also be included. Techniques in oral expression will be refined. Vocabulary development will be continued. A term paper will be required in addition to a minimum of eight parallel readings chosen from the English III reading list. Students will be responsible for obtaining these parallel reading materials.

English IV - (130) Developmental (1 unit)
Prerequisite: English III
This course continues concentration on developmental reading skills, sentence construction, and paragraph writing (narrative, descriptive, expository, and persuasive). Course content will include communication and critical thinking skills necessary for everyday living.

English IV - (131) General (1 unit)
Prerequisite: English III
This course is designed for students who do not plan to further their educations beyond the high school level. This course continues concentration on developmental reading skills, sentence construction, and paragraph writing (narrative, descriptive, expository, and persuasive). Content will include communication skills and critical thinking skills.

Tech-Prep English IV - (132) (1 unit)
Prerequisite: English III

This course continues concentration on communication in the workplace. The student will develop skills in how to communicate with customers, how to solve interpersonal conflicts, how to respond to requests, and how to retrain for a new job. Also included will be reading and understanding literature.

English IV - (144) College Prep or Advanced Composition (1 unit)
Prerequisite: English III

This course will emphasize the study of British literature in addition to the concentration on advanced reading skills. Emphasis will be placed upon essay writing, literary analyses, and creative expression. Development of individual writing styles will be encouraged and stressed. Vocabulary development and techniques in oral expression will continue to be refined. Requirements include a research paper and a minimum of ten parallel readings will be required. Parallels will be selected from the English IV reading list. Students will be responsible for obtaining these parallel reading materials.

English IV (145) - Advanced Placement (1 unit)
Prerequisite: English III Gifted & Talented or a 90% score on the CTBS and a "B" average in College Preparatory English III.

Concentration on advanced reading skills will continue with an emphasis upon an intense study of the four genres: novels, short stories, poetry, and drama. Essay writing, literary analyses, and creative expression will be stressed. Refinement in vocabulary development and techniques in oral expression will continue. Journal writing and two research papers will be required. Students will read ten parallel readings selected from the English IV reading list. Students will be responsible for obtaining these parallel readings.

Journalism - Annual (160) (1/2 unit)
Prerequisite: 3.0 on BSAP Writing grades 11 & 12

The primary purpose of the Journalism - Annual class is the production of the school yearbook. At the completion of the course, students will be familiar with layout and design and with writing for publication. Due to the nature of the course, class enrollment is restricted.

Journalism - Newspaper (162) (1/2 unit) Grades 10 - 12
Prerequisite: 3.0 on BSAP Writing

Journalism is an elective course limited to students who wish ot produce the student newspaper, The Tiger Times. Instruction will be given in journalistic style and production skills.

French I (174) (1 unit)

The beginning course in the language in which fundamentals of grammar are taught through conversation, composition, and dictation. A foundation is provided for further study and the ability to eventually read and speak the language. A student should have at least a "B" average in English, and the course is for students in grades 9 - 12. Students are required to purchase a workbook.

French II (175) (1 unit)

Prerequisite: French I

A continuation of French I with attention to grammar, conversation, composition and dictation. Practice in the spoken language with stress on vocabulary building, pronunciation, intonation, and comprehension. Some written work to increase accuracy. Students are required to purchase a workbook.

Japanese I (176) (1 unit) Grades 10 - 11

This course will provide students with the opportunity to develop skills in hearing, speaking, reading and writing the Japanese language as well as an introduction to the culture of Japan. The primary instructional strategy used will be that of eliciting student involvement in the learning process.

Japanese II (177) (1 unit) Grades 11 - 12

Prerequisite: Japanese I

This course will provide students with the opportunity to further develop skills in listening, speaking, reading and writing the Japanese language as well as to continue the study of the culture of Japan. Japanese language students will learn additional vocabulary and new points of grammar, increase familiarity with Japanese characters, further their understanding and appreciation of the Japanese culture, people and society, and expand their thinking and awareness of themselves and their world.

Russian I (178) (1 unit) Grades 10 - 11

This course will be designed to give the student a basic foundation in Russian grammar, syntax, vocabulary and construction. In addition to the study of the language itself, Russian I students will also explore Soviet history and culture in greater detail.

Russian II (179) (1 unit) Grade 11 - 12

Prerequisite: Russian I

This course is designed to expand and enhance the foundation the student received in Russian I. The course will contain a review of Russian I material and will proceed to introduce the student to more advanced elements of Russian grammar, more extensive speech practice, and frequent translations. In addition, students in Russian II will also study much about Soviet culture and history.

Spanish I (184) (1 unit)

The beginning course in the language in which the fundamentals of grammar are taught through conversation, composition, and dictation. A foundation is provided for further study and the ability to eventually read and speak the language. This course is for students in grades 9 - 12 with a "C" average or higher in English.

Spanish II (185) (1 unit)

Prerequisite: Spanish I

A continuation of Spanish I with attention to grammar, conversation, composition and dictation. Practice in the spoken language with stress on vocabulary building, pronunciation, intonation, and comprehension and written work to increase accuracy.

Spanish III (186) - (1 unit)

Prerequisite: Spanish I & Spanish II

Twelfth grade students will continue the study of the Spanish language while expanding the practical vocabulary needed for active language use and deepening their appreciation of Hispanic culture through literary works of Spanish and Latin American authors. The course consists of fourteen units divided into the following four sections: (1) Humorous Life Scenes; (2) Practical Spanish; (3) Grammar Sections; and (4) Literary Reading.

Math Lab I (200) (1 unit)

A course for students who did not meet the standard on the BSAP or CTBS tests in Mathematics. Students will work at their own pace with the aid of microcomputers in areas in which they are deficient.

Math Lab II (202) (1 unit)

A continuation of Math Lab I for those students who still have not achieved standard on either the BSAP or CTBS tests.

Remediation Math Lab III (203)

A course for students who have not met the mathematical standard on the high school exit exam and have earned 2 units credit in Math Lab. Students will work individually in areas in which they are deficient. No credit will be awarded for this course.

Admission for this course will be based upon mathematics score on the high school exit examination.

General Math I (201) (1 unit)

Prerequisite: BSAP score of 700.

This course is designed for general arithmetic instruction and problem solving skills. It will include the four basic operations with whole numbers, fractions, and decimal fractions. Percentages and practical applications of these skills will also be included. In addition reading, interpreting and preparing graphs and charts, measurements and basic geometry will be introduced.

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General Math II (220) (1 unit)

Prerequisite: General Math I

This course reinforces students' knowledge of basic arithmetic skills, consumer applications, measurement, graphs, statistics and probability, geometry, and algebra. Emphasis will be placed on the use of these topics for the exit exam.

Applied Math II (225) (1 unit)

Prerequisite: 1 math unit excluding Math Lab

Applied Math II is a set of modular learning materials prepared to help high school vocational students and others develop and refine job-related math skills. The overall course includes material that focuses on arithmetic operations, problem-solving techniques, estimation of answers, measurement skills, geometry, data handling, simple statistics, and the use of algebraic formulas to solve problems.

General Math III (250) (1 unit)

Prerequisite: 2 math units and BSAP passed

This course is designed to meet students' current needs as well as their future needs as responsible adults and consumers of goods and services. It will include a review of basic operations and concepts, but primary emphasis is on the applied use of mathematics as a consumer. Topics will include use of credit, money management, purchase of goods and services, employment and income, and the rights and responsibilities in the market place.

Applied Math III (251) (1 unit)

Prerequisite: General Math II   Teacher recommendation advised.

This course is designed for students who are seeking a vocational career especially in the field of electronics. This was developed to teach problem solving and computational skills to vocational students.

Pre-Algebra (213) (1 unit)

This course offers students the opportunity of acquiring elementary algebraic skills before enrolling in Algebra I. Recommended prerequisite: "C" average in previous math course.

Algebra I (214) - CP (1 unit)

Prerequisite: Minimum score of 700 on BSAP test.

Recommendation: Satisfactory score on Orleans-Hanna Algebra Prognosis Test and teacher recommendation.

This course is designed for students who plan to take post-secondary courses. Material covered shall include operations of real numbers, solving equations and inequalities, polynomials, ratios algebraic fractions, rational exponents, graphs, and problem solving.

Algebra II (234) - CP (1 unit)

Prerequisite: Algebra I   Recommended: "C" average

This is a study of the vocabulary and operations of algebra, the properties of real numbers, linear open sentences, factoring polynomials, rational expressions, radicals and irrational numbers, quadratic equations and functions, exponential functions and logarithms, and basic trigonometric functions and relations.

Algebra II (235) - Honors (1 unit)
Prerequisite: Algebra I - Honors
Recommended: "C" average in Honors Algebra I

The same topics will be studied in this course as the regular Algebra II with the addition of sequences and series, permutations and combinations, probability, and matrices and determinants.

Geometry (244) - CP (1 unit)
Prerequisite: Algebra I
Recommended: "C" average in Algebra I

This course is a study of traditional Eucledian Geometry. The student will become familiar with both plane and solid figures, and the relationships of these figures will be studied through the use of undefined terms, definitions, postulates, and theorems. The use of these undefined terms, theorems, etc., in a hands on approach should help the students to develop the ability to reason logically.

Geometry (245) - Honors (1 unit)
Prerequisite: Algebra I - Honors
Recommended: "C" average

The topics covered in this geometry course will be the same ones covered in the regular course, except that they will be covered in a formal approach.

Algebra-Trigonometry (274) - CP (1 unit)
Prerequisite: Algebra I, II, and Geometry.
Recommended: "C" average in Algebra II

Course content will include linear relations and functions, theory of equations, matrices and vectors, circular functions, trigonometric functions, graphs and inverses of the trigonometric functions, applications of trigonometry, sequences and series, polar coordinates and complex numbers, exponential and logarithmic functions, analysis of the straight lines, conics, probability, descriptive statistics, limits, derivatives, and integrals.

Algebra-Trigonometry (275) - Honors (1 unit)
Prerequisite: Honors Algebra I, II, and Geometry.
Recommended: "C" average in Honors Algebra II

The course content will be the same as for Algebra-Trigonometry - College Preparatory, but the content will be covered in greater depth and at a faster rate.

Calculus (284) - CP (1 unit)
Prerequisite: Algebra II Recommended: "C" average

This course will provide college bound seniors who have good algebra skills with a foundation in sequences and series as they apply to limits. The derivations of algebraic, trigonometric, logarithmic, and exponential functions will be studied and standard applications will be explored. Also covered will be the basic integration techniques and application to motion, area, and volume problems.

Calculus (285) - AP (college credit)
Prerequisite: Honors Algebra-Trigonometry
Recommended: "C" average in Honors Algebra-Trigonometry

This course is designed for students who have a good background in algebraic and trigonometric skills. The theory of limits, derivatives of algebraic, trigonometric, logarithmic, and exponential functions, and applications will be studied. Integration techniques and applications to motion, area, and volume will be covered.

General Science (301) (1 unit)

This course is divided into four units: physical science, life science, and earth and space science. Each unit is designed to provide a basic understanding and hopefully an appreciation for these fields.

Tech-Prep Science (302) (1 unit)

This course is designed for students following the Tech-Prep Program of Studies. Tech-Prep Science is designed for students wishing to further their education in a technical school upon completion of high school. Areas explored will include basic concepts of biology, chemistry, physics, astronomy, and geology. A $3.00 lab fee will be assessed.

Physical Science (314) - College Preparatory (1 unit)

This course is designed to give academically oriented students a basic understanding of the fundamentals of chemistry and physics in preparation for more advanced science courses. Included in this study are measurement, motion, atomic structure, Periodic Table, compounds and bonding, chemical families, organic chemistry, chemical reactions, light, sound, heat, electricity, radioactivity, and nuclear energy. **In conjunction with CP Physical Science, students should be enrolled in Algebra I or Pre-Algebra.**
Laboratory work is required. A $3.00 lab fee will be assessed.

Tech-Prep Biology I - College Preparatory (322) (1 unit)

This course is designed for the average and above average student who is intending to further his studies in a technical school. The course will involve an overview of biology which will include cellular structure & function, botany, genetics, taxonomy, invertebrates & vertebrates, anatomy, human anatomy and physiology. Lab work is involved. A $3.00 lab fee will be assessed. Students entering the Health Occupations program in the 11th grade need this course.

General Biology - (323) (1 unit)

This course is designed for students experiencing difficulty in the basic skills areas. It is intended to give a better understanding and appreciation of life. This course will cover features of life, the cell, the animal, the plant, classifications, animal systems, plant parts, reproduction and development, genetics and ecology.
A $3.00 science fee will be assessed.

Biology I - (324) College Preparatory (1 unit)

Prerequisite: Physical Science

This course is designed for the average and above average college bound student. The course deals with cellular structure and function, botany, genetics, taxonomy, invertebrate and vertebrate anatomy, and human anatomy and physiology. Extensive lab work is involved. A $3.00 science fee will be assessed.

Biology - (325) Gifted & Talented (A.P.P.L.E. III)/Honors (1 unit)

Prerequisite: Physical Science CP or Honors

This course is designed for high academic achievers. It is a comprehensive introduction to biology that will include cellular structure & function, botany, genetics, taxonomy, invertebrates & vertebrates, anatomy, human anatomy & physiology. Individual journal reviews will be required as well as a major research paper. Essay question will be given periodically and graded according to the standards on the AP exam. Extensive lab work is involved. Admission is based on state criteria. A $3.00 lab fee will be assessed.

Chemistry (344) - CP (1 unit)

Prerequisite: Algebra I

This course is designed for the average and above average college bound student. Topics to be covered include measurement, matter, chemical reactions, stoichiometry, atomic structure, chemical bonding, phases of matter, chemical thermodynamics, chemical kinetics and equilibrium, acids, bases, and salts, electrochemistry, and organic chemistry. Students will be expected to use applied mathematics. The major emphasis of the course is on problem solving. Students are required to purchase safety goggles to use in the laboratory. A $3.00 science fee will be assessed.

Chemistry - (345) Gifted & Talented (A.P.P.L.E. III)/Honors (1 unit)

Prerequisite: Algebra I

This is a rigorous chemistry course designed for highly motivated, high academic achievers . Topics to be covered include measurement, matter, chemical reactions, stoichiometry, atomic structure, chemical bonding, phases of matter, chemical thermodynamics, chemical kinetics and equilibrium, acids, bases, and salts, electrochemistry, and organic chemistry. These topics will be covered in depth. Students must be mature enough to accept responsibility for their learning. Students will have to purchase safety goggles for use in the lab. A $3.00 lab fee will be assessed.

Principles of Technology (351) (1 unit)

This science course is designed to prepare students for technical careers. Students will study the mechanical, fluid, electrical and thermal principles on which modern equipment operates. The course is taught in a laboratory setting. A $3.00 lab fee will be assessed.

Physics (354) - CP (1 unit)

Prerequisites: Physical Science, Algebra I & II, and Chemistry.

Physics includes the study of motion, force, energy, thermal effects, sound, light, electricity, magnetism, and atomic particles. A $3.00 lab fee will be assessed.

Computer Literacy (360) (1/2 unit)
Prerequisite: Typing I or currently enrolled in Typing I

This course is designed to enable high school students to understand the impact of computers on today's society. Classroom lecture, discussion, guest speakers, and hands-on work will be included in class activities. Topics include society before computers, computer history, computer capabilities and limitations, computer careers, and an introduction to programming in BASIC.

Computer Programming (361) (1/2 unit)
Prerequisite: Computer Literacy, Algebra I (80 average)

This course is designed to introduce students to programming in BASIC. Through "hands-on" experience, students learn techniques that allow them to solve problems encountered both in and out of school. They will become proficient in the use of loops, conditional statements, graphics, math functions, etc.

World Geography (400) - General (1 unit)

This elective course is designed to develop a student's understanding of the relationship between man and his environment. Students will examine such topics as physical landscape, climate, culture, government, and population of each region studied. Basic map and globe skills and interpretations of tables and charts will be stressed. This course is provided in order that non-college bound students can meet state diploma requirements. A workbook is required.

World Geography (404) - College Preparatory (1 unit)

In addition to the requirements and content of General World Geography, this course will stress understanding of the following: the meaning of place and location; how people provide for their wants and needs; development of international awareness; the promotion of human progress. Parallel readings, research papers, oral reports, and workbook are required.

World History (424) CP - (1 unit)

This elective course is designed for those students planning to enter a major four-year college or university. It provides a general study of the prominent people and events of both eastern and western civilizations that shaped our world today, beginning with the prehistoric era and moving to the present. Parallel readings and student reports are required, as is the purchase of a workbook.

World History (425) - (Honors) (1 unit)

This elective course is a comprehensive study of the major events and trends which influenced the development of western civilization from the Romans to World War II. Cause and effect relationships are stressed. Parallel readings and a research project are required. This course is recommended for students planning on taking advanced U.S. History courses. Emphasis is placed upon individual study and the higher level thinking skills of analysis, synthesis and evaluation. The required reading list is as follows: Ivanhoe, Luther: Here I Stand, Ecstasy, Goodbye To All That, and Hard Times.

United States History (430) - Basic (1 unit)

Especially designed for students with reading or learning difficulties or students repeating the course. **Admission is based on standardized test scores.** Besides providing a general overview of the events and personalities which helped to shape this nation, the course will stress the basic reading skills of decoding and word meaning, details, main idea, and reference usage. A workbook is required.

United States History (431) - General (1 unit)

A general survey of the people and events which played a significant role in the development of this nation. The course is designed to allow non-college bound students or students who plan to attend a junior college or technical school to meet the state requirements for graduation. A workbook is required.

United States History (434) - College Preparatory (1 unit)

Prerequisite: World History is recommended.

This course provides an in-depth examination of the major personalities, trends, and events which shaped this nation's development. Parallel reading assignments, essay writings and a research paper are required, as well as the purchase of a workbook and four supplementary reading books.

The required reading list is as follows:

Washington, The Indispensable Man	A Stillness At Appomattox
The Jungle	Hiroshima

United States History AP (435) (1 unit)

Prerequisite: World History and College Prep U.S. History are recommended. Admission is determined by the state identification criteria and teacher recommendation.

This is a **college level course** designed for the **superior** student. The course allows students to meet diploma requirements, while at the same time prepares them for a cumulative examination. Depending upon their score on the exam and the college or university they attend, students can receive up to six hours of college credit. Students are required to purchase supplementary books and materials.

American Government (450) - General (1/2 unit)

A general course designed for students with reading or learning difficulties. Besides providing a general overview of the workings of the nation's various levels of government and the rights of the individual, the course will stress the basic reading skills of decoding and word meaning, details, main idea, and reference usage. The course will allow non-college or students who attend a 2-year college or technical school to meet state graduation requirements.

American Government (454) - College Preparatory (1/2 unit)

This course is a comprehensive survey of the American political system and the individual's place in it. Essays and parallel readings are required.

Economics (440) - General (1/2 unit)

General Economics is a required course specifically designed for students with reading or learning difficulties. Besides providing a general survey of various aspects of the American free enterprise system and the role of individuals in that system, the course will also stress basic reading skills, such as word meaning, details, main idea, and reference usage. This course is designed for non-college bound students or students who plan to attend a junior college or technical school.

Economics (444) - College Preparatory (1/2 unit)

This required course is designed to give students an in-depth study of the American free-enterprise system and their role in the system. Students will examine such topics as business organizations, insurance, using credit and checking, taxation, and interest rates. In addition, college preparatory students will investigate supply and demand, investments, money, banking, and competing economic systems. an essay and outside research will be stressed.

Psychology (460) - General (1/2 unit)

This class will provide opportunities for students to analyze their own decision-making skills and apply their knowledge about behavior to constructive methods of responding to life situations. A research project and essay writing are required for this course.

Sociology (461) - General (1/2 unit) SENIORS ONLY

This class investigates concepts such as compromise, culture, family, ethnicity, religion, and urbanization. This course will also include Comprehensive Health Education. The Comprehensive Health Education component will include 750 minutes of reproductive health, pregnancy prevention, and sexually transmitted diseases. A sociological research project and essay-writing are required for this course. Psychology is recommended as a prerequisite.

All seniors are required to take either Family Life or Sociology.

Introduction to Business (620) (1 unit) Grades 10 - 12

This is a general course in business that is suited to all 10th grade students and is highly recommended for students who plan to further their education in business and economics. Studies are made of money, banking, consumer credit, insurance, budgeting, etc. Students are required to purchase a workbook for this course.

Accounting I (630) (1 unit) Grades 11 - 12

This course covers the basic elements of accounting by looking at debits and credits, journal entries, posting various types of ledgers and journals, and briefly looking at partnerships and corporations. Students are required to purchase a workbook for this course.

Accounting II (631) (1 unit) Grade 12

Prerequisite: Accounting I

A continuation of Accounting I with particular emphasis on partnerships and corporations and accounting procedures relevant to the areas of cost accounting, etc. Purchasing a workbook is required.

Typing I (600) - Vocational (1 unit) Grades 10 - 12

This course introduces students to the fundamentals of typing by the touch system. It emphasizes the importance of good typing techniques, keyboard mastery, and good typing habits. This course covers academic applications of typing skills and further development of speed and accuracy. The following typing tasks performed in a business office are stressed: preparing memorandums, business letters, (learning the different letter styles), informal and formal reports; constructing simple and complex tables (statistical typing); and a review of English grammar guides for capitalization, numbers and punctuation. Students are required to purchase a workbook.

Personal Typing (601) (1 unit) Grades 10 - 12

This course introduces students to the fundamentals of typing by the touch system. It emphasizes the importance of good typing techniques and habits. Basic applications include learning to prepare personal/business letters, short reports, outlines, and simple tables (tabulation). Students are required to purchase a workbook.

Typing II (610) - Vocational (1 unit) Grades 11 - 12

Prerequisite: Typing I

Typing II is a continuation of Typing I. The basic skills, techniques, and work habits are reinforced. The performance of routine office tasks continues to stress the use of proper formats, accuracy and speed needed to develop good production skills. Students are required to purchase a workbook for this course.

Office Procedures (650) (1 unit) Grade 12

Office procedures is a terminal business course for senior business majors. It is designed to integrate previous knowledge and skills learned in other business courses. It also provides training in the skills of the following areas: filing, using the telephone, using adding and calculating machines, duplicating machines, and voice-writing equipment.

Shorthand I (640) (1 unit) Grades 11 - 12

Prerequisite: Typing I or enrolled in a typing course

This course is an introductory course in shorthand that introduces the fundamentals, rules and principles of Gregg Shorthand. Students are required to purchase a workbook for this course.

Shorthand II (641) (1 unit) Grade 12

Prerequisite: Shorthand I

The first semester of this course is devoted mainly to dictation, as well as to transcription, which gives practice in transcribing from shorthand back to English. Vocabulary building is also emphasized. The second semester is devoted to speed building which helps develop both speed and accuracy in shorthand. Students are required to purchase a workbook for this course.

Business Law (660) (1 unit) Grade 12

This course is especially good for students planning a secretarial career in law or a student planning on a business of his own. Students become familiar with the basic language of law as it relates to business and study such areas of concentration as contracts, torts, and legal documents. Students are required to purchase a workbook for this course.

Data Processing (670) (1/2 unit) Grades 11 - 12

In fundamentals of Data Processing, students are taught flow charting for manual, unit record, and electronic data processing. Students are taught how to plan card fields for reading information and how to interpret data in code form. Programming concepts are presented for BASIC language and COBOL. Students are required to purchase practice sets for this course.

Office Machines (671) (1/2 unit) Grades 11 -12

Prerequisite: Data Processing or permission of the instructor.

Office machines provides the student with a working knowledge of the fundamental operations of the major types of adding-calculating machines: ten-key, printing calculator, electronic calculator, rotary calculator, also the operation of a dictaphone and spirit duplicator. Students will need a machines course manual.

Word Processing (680) (1/2 unit)

Prerequisite: Typing I or Personal Typing

This course is designed to provide an introduction to the history, concepts, procedures, and job opportunities of word processing. Competencies are developed in both oral and written communications, equipment proficiency (keying, dictation, and transcription), reprographics, records management, and dissemination. The student will be able to pursue a career in today's office equipped with electronic technology.

Health Occupations Education I (690) (2 units credit)

This two hour course is designed for eleventh graders. This course introduces the students to the health care industry. Areas explored include nursing, physical therapy, dietary services, dental care, x-ray technology, pharmacy and laboratory procedures. The course is taught through a classroom lecture/laboratory approach.

Health Occupations Education II (691) (3 units credit)

This three hour course is designed for second year twelfth grade students. The course prepares students to seek employment at the technician and/or assistant level by expanding the basic skills and knowledge acquired in the first year course through on-the-job training in local hospitals, extended care facilities, clinics, and doctors' offices. Emphasis is placed on expanding and refining the performance skills, related theory and leadership qualities which have been developed and are expected of an entry level employee or graduate seeking further education at the post secondary level.

Prevocation (710) (1 unit) Grades 9 and 10

This course allows students to explore a variety of career preparation fields. The student chooses 4 to 10 career fields to explore. Emphasis is given to career planning, the world of work and entry level skills needed for a smooth transition from formal schooling to work. All rotations include classroom activities, labs, guest speakers, field experiences and project work. A workbook and high top leather boots will be required. A $5.00 materials fee will be assessed. Prevocation is not an occupational course.

Agricultural Science (700) (1 unit) Grades 9 - 12

The agricultural science course deals with the origins, structures, and functions of plant and animal life, and the conservation of natural resources. Emphasis is placed on determining the role of agriculture in our society and the importance of agriculture to the welfare of the world. Basic agricultural mechanical skills, safety, and agricultural leadership are included as a part of the year's instructional program. Each student is expected to begin a supervised work experience program during the year. Students will need to purchase a workbook for this course.

Agricultural Production (720) (1 unit) Grades 10 - 12

Prerequisites: Agricultural Science and high top leather boots.

The agricultural production course is designed for second year agricultural students. The course prepares students in the basic skills needed for the job entry in agricultural production and agricultural occupations. Emphasis is placed on basic principles of agricultural production. Each student is expected to further develop his supervised work experience program during the year.

Agricultural Mechanics (730) (1 unit) Grades 11 - 12

Prerequisites: Agricultural Science and Production.

The agricultural mechanics course is a third-year course designed to strengthen the mechanics skills needed for job entry in production agriculture. Safety glasses and high top leather boots are required.

Livestock Management (740) (2 units) Grades 11 -12

Prerequisites: Agricultural Science and Production.

The two credit livestock management course is designed for students who desire training for employment in the livestock business. It is specifically designed to teach students managerial and operational skills needed by an owner or manager of a livestock operation. Students will be required to demonstrate basic management skills. Course time is divided into approximately 120 hours of classroom instruction and 240 hours of laboratory exercises.

Forestry (750) (1 unit) Grade 12

Prerequisite: Agricultural Science, Production, and Mechanics and steel-toed boots.

The forestry and pulpwood production course is designed to lead toward employment in forestry and pulpwood industry occupations. Each student must have a minimum 180 hours of in-school instruction consisting of 60 hours classroom, 60 hours laboratory, and 60 hours field work.

Art I (760) (1 unit)

A general/basic art course covering beginner art. Beginning with basic drawing with pencil, the student advances to charcoal, pen and ink, pastel, and finally water color. The student will also cover design, color theory, composition, and some art history. Weekly sketches and participation in art shows are required.

Art II (761) (1 unit)

Prerequisite: Art I

Serious students of Art I will further their studies in advanced water color, tempera, ceramics, silk screen, acrylics, and several choices of craft projects. Art history is also further explored. Weekly sketches and participation in art shows are required.

Arts & Crafts (1/2 unit) grades 10, 11, 12

This is an art course for the student interested in different crafts. Possible projects for this course will be batik, tie dye, basketry, stenciling, leather crafts, candle making, tile mosaics, pottery, weaving and macrame. No art history or sketches are required. Participation in art show is required.

Honors Art - (762) Gifted & Talented A.P.P.L.E. III Plus

Prerequisite: State identification criteria

This is a comprehensive course intended for identified talented students. It includes art appreciation (aesthetics, art history and two-and-three dimensional media). Strong emphasis on composition and individual techniques shall be stressed. Drawing from imagination and observation shall continue to be stressed throughout the course. All students are required to keep a portfolio and sketchpad.

Mixed Chorus (770) (1 unit)

Prerequisite: audition

This course develops four-part mixed choral singing and includes instruction in sight-singing, proper tonal production, music theory and performance techniques. Performance is required of all students.

Chorale (771) (1 unit)

Prerequisite: Choral experience and audition.

The chorale is designed to accommodate the more advanced vocal music students. Auditioning students must present a vocal solo and demonstrate sight-reading ability. This group will regularly perform a wide variety of music from show choir tunes to advanced classical vocal works. Dance ability is desired. Numerous performances will be required of all members.

Band (780) (1 unit)

Band is open to students in grades 9 - 12. Students who sign up for band are required to participate in the marching band at football games and parades. They also are required to participate in the concert band. Students will be selected for the Pep Band by invitation for home basketball games and other performances at other schools. Activities culminate at the annual Spring Concert held near the end of April.

Jazz Ensemble (781) (1 unit)

The Jazz Ensemble is open to talented music students who seek to play and perform music other than the concert or marching band music. Music theory will be an integral part of this course. A variety of music will be played and performed including contemporary music and jazz. Students wishing to enroll in the Jazz Ensemble must have had previous music experience. Admission is based on teacher recommendation.

Creative Living I (800) - Basic Consumer Homemaking (1 unit)

This course is for young men and women who desire knowledge and lab experience in all areas of life skills. The areas studied are interior design, careers, fashion trends and construction, parenting, financial management, food, and fitness.

Creative Living II (801) - Adv. Consumer Homemaking (1 unit)

Prerequisite: Creative Living I

This course is a more in-depth study of Creative Living I with emphasis on individual projects and lab experiences. The students will continue extensive work on the industrial sewing machines.

Family Life (811) (1/2 unit) SENIORS ONLY

The focus is on premarital relationships, marriage, and marital adjustments. It also deals with birth control, family violence, adoption and divorce. Each student will be required to participate in planning and performing a wedding.

This course will also include Comprehensive Health Education. The Comprehensive Health Education component will include 750 minutes of reproductive health, pregnancy prevention, and sexually transmitted diseases.

All seniors are required to take either Family Life or Sociology.

Interior Design (820) (1/2 unit) Grades 10 - 12

Architectural designs, interior design elements, choosing furniture and accessories are included in this course. Individual projects involve blueprint drawing, decorating and making accessories.

Child Development (810) (1/2 unit) Grades 10 - 12

This is a study of prenatal development, infants, toddlers, preschoolers and school age children. Topics such as children's play, discipline techniques, handicapped children, and child abuse are included.

Independent Living (830) (1/2 unit) Grades 10 - 12

In this course students will research several careers of their choice using the SCOIS terminal. After deciding on their career they will experience through class projects what type of life style they can expect from living off the salary of that career.

Clothing & Textiles (830) (1/2 unit) Grades 10 - 12
Clothing and Textiles is a semester course which involves students in planned learning experience to acquire basic skills in clothing construction. Skill in the operation and maintenance of the home sewing machine, industrial sewing machine, basic hand sewing techniques, pattern interpretation and layout, and garment construction will be acquired through a combination of teacher demonstrations and student practice and application.

Physical Education I (840 & 850) (1 unit) Grades 9 - 12
This course is designed to provide students with basic concepts of team activities and instruct students in Comprehensive Health Education. The Comprehensive Health Education component will include 750 minutes of reproductive health, pregnancy prevention, and sexually transmitted diseases. P. E. I includes fundamentals in volleyball, basketball, aerobics, gymnastics, track and field, flag football, badminton, ping-pong, softball, and wrestling (boys only). Students are also introduced to a basic weight-lifting program.

Students are encouraged to develop a continuing respect for their physical health and physical fitness by developing lifetime skills and interest. Motor fitness and health related fitness are designed to provide students with a long term goal of improving physical fitness. There will be a $3.00 P.E. fee.

Boys' Physical Education II (841) (1 unit) Grades 10 - 12
Prerequisite: P. E. I
P. E. II is a continuing physical education course designed to include major team sports and seasonal sports with emphasis on theory, skills, and basic rules. There will be a $3.00 P.E. fee.

Girls' Physical Education II (851) (1 unit) Grades 10 -12
Prerequisite: P. E. I
P.E. II is a continuing physical education course designed to allow the students to utilize the theory, skills, and basic rules of team and seasonal sports. Areas of emphasis include weight training and conditioning techniques used during athletic training. There will be a $3.00 P.E. fee assessed.

Driver's Education (860) (1/2 unit) Grades 9 - 12
Driver's Education's aim is to produce better and safer drivers by teaching the student proper methods and techniques involved in defensive driving. It consists of 30 hours of classroom instruction and 6 hours of behind the wheel supervision. A student must be 15 years of age to take the behind-the-wheel training. Course fee must be paid the first week of school.

Personal Health (870) (1/2 unit) Grades 10 - 12
This course serves as an introduction to the various aspects of physical, mental, and social health. Instruction is given to aid students in understanding their growth and development in adolescence and to develop decision-making skills to make intelligent choices toward a more abundant life. Areas of major importance include the following topics: mental disorders, coping with stress, physical fitness, nutrition, personal hygiene, and the life cycle.

Community Health (871) (1/2 unit) Grades 10 - 12

This course continues the study of personal health by relating the impact that one's personal health habits have on the general health of the community or society. Current and authentic information will be presented to challenge the students constantly to make judgments based on objective data rather than widely known health misconceptions. Areas of major importance include the following: drug and alcohol abuse, cigarette smoking, infectious disease, heart diseases, cancer, accidents/first aid, and health care.

Introductory Horticulture (880) (1 unit)

This course is an introduction to the practical application of the basic principles of horticulture. Students will explore the areas of plant growth, plant reproduction, and greenhouse management. Admission will be based on teacher and counselor recommendation.

Electronics I (930) (2 units)

Electronics I is a highly technical instruction program that introduces the student to the basic fundamental of an advanced electronic program. This program will prepare the student to a assemble, install, operate, trouble shoot, and maintain electrical electronic equipment used in business and industry. All students enrolled in this program are encouraged to pursue further education in a technical institution upon graduation. Students are selected based upon grades, attendance and standardized test scores.

Electronics II (931) (3 units)

Prerequisite: Electronics I

The Electronics II program is an extension of the Electronic I program. Electronics II will deal with a more advanced program of study in the electronics field. This program will teach the student to analyze, troubleshoot and repair various specialized electronic circuitry. Upon completion of the two-year electronic program the student will be able to enter a technical institution with possible exemption from some of the basic programs of instruction.

Drama (1004) (1/2 unit)

Drama is offered for eleventh and twelfth graders who are interested in a study of the theater as a division of art and literature. This course involves acting, the study of the history of drama, a description of the various forms of drama, and participation in class and before student audiences. Drama instructor approval is needed.

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APPENDIX G

SCHOOL DISTRICT OF OCONEE COUNTY

ELECTRICITY/ELECTRONICS

TECHNICAL COLLEGE/CAREER PLAN

NINTH GRADE

English I
P.E./R.O.T.C.
Physical Science
Social Studies
Algebra I
Elective

TENTH GRADE

English II
Industrial Technology I
Principles of Technology I
U. S. History
Algebra II
Elective

ELEVENTH GRADE

Applied Communications I
Applied Math I/Geometry
Elective *
Electricity/Electronics I
Electricity/Electronics I
Electricity/Electronics I

TWELFTH GRADE

Applied Communications II
Government/Economics
Elective *
Electricity/Electronics II
Electricity/Electronics II
Electricity/Electronics II

FOUR YEAR COLLEGE PLAN

NINTH GRADE

English I
Algebra I
Social Studies/W.History
P.E./R.O.T.C.
Physical Science
Elective

TENTH GRADE

English II
Algebra II
Geometry
Foreign Language I
Biology
Elective

ELEVENTH GRADE

English III
Algebra III/Trig
Chemistry
Foreign Language II
U. S. History
Elective

TWELFTH GRADE

English IV
Government/Economics
Physics/Calculus
Electricity/Electronics I
Electricity/Electronics I
Electricity/Electronics I

Suggested Electives: Keyboarding/Introduction to Computers, Industrial Technology II, Principles of Technology II, Driver's Ed., Applied Math II, Algebra III/Trig.

(Sample of Oconee County's curriculum pathways in each of the four Tech Prep cluster areas. The complete document, which has been approved, is 92 pages and was used as the basis for a new career/course planning guide for students. The guide is scheduled to be printed in January of 1991.)

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COMPETENCIES NEEDED FOR RELATED EMPLOYMENT AND POSTSECONDARY EDUCATION IN ELECTRICITY AND RELATED AREAS

Communications

1. Students will be able to demonstrate an understanding of technical vocabulary.
2. Students will be able to access information related to electricity.
3. Students will be able to determine appropriate resources for given tasks.
4. Students will be able to comprehend technical materials, such as technical manuals, blue-prints, catalogs, code books, etc.
5. Students will be able to communicate orally and in writing, i.e., giving and following directions, preparing technical reports.

Mathematics

1. Students will be able to add, subtract, multiply, and divide fractions.
2. Students will be able to add, subtract, multiply, and divide decimals.
3. Students will be able to measure lengths, weights, and volumes using the appropriate units in both the English and metric system.
4. Students will be able to convert units within both the English and metric systems.
5. Students will be able to find perimeter and area of given figures.
6. Students will be able to substitute into given formulas and evaluate the resulting expressions.
7. Students will be able to add, subtract, multiply, and divide rational numbers.
8. Students will be able to solve basic equations.
9. Students will be able to evaluate expressions involving exponents.
10. Students will be able to understand and use the basic principles of Boolean Algebra, logic, and networking.
11. Students will be able to use sine, cosine, and tangent ratios.
12. Students will be able to draw and find the resultant of two given vectors.
13. Students will be able to interpret graphs, charts, and tables.
14. Students will be able to use a scientific calculator or computer in working problems.
15. Students will be able to solve real world word problems involving electricity.

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Science

1. Students will be able to complete a course covering objectives similar to those included in Physics I or Principles of Technology.
2. Students will be able to complete a Physical Science Course.

Technical

1. Student will be able to identify types of metering equipment.
2. Student will be able to understand correct procedures for reading and measuring A/C and D/C meters.
3. Students will be able to use and understand blue print symbols and schematics.
4. Students will be able to use materials, equipment, hand and special tools correctly.
5. Students will be able to understand local and state electrical, fire, and safety codes.

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WAYS VOCATIONAL AND ACADEMIC TEACHERS CAN WORK TOGETHER TO ADVANCE THE COMMUNICATIONS, MATHEMATICS, AND SCIENCE COMPETENCIES OF VOCATIONAL COMPLETERS

1. A common in-service course should be offered for academic/vocational teams (e.g., math teacher and voc-ed teacher of mathematics). Time should be devoted to planning the curriculum in both content areas so as to promote maximum effect and minimum duplication. A common planning period should be scheduled during the academic year to provide for an ongoing teams planning/teaching effort. The team should be given as much freedom as possible to determine the curriculum they are asked to teach.
2. There should be a board of education mandate to advance the competencies. It should be made abundantly clear from the superintendent and all other administrators exactly what is expected.
3. Provide for vocational teachers to visit content teachers and vice versa. (Maybe the principal could take the visiting teachers class.) It is important that both understand fully the nature of the other's content and the level of expectation for mastery of that content.
4. Provide for social interaction of the vocational and content teachers. This should be planned and conducted outside the school. Try forming a bowling team, square dance club, card club, or just schedule a time when all parties can get together.

DEVELOPING AND IMPLEMENTING A MORE CHALLENGING PROGRAM OF VOCATIONAL AND ACADEMIC STUDY

1. Solicit input from advisory committees (from business and industry). Possibly establish a similar committee of parents. A regularly scheduled meeting of these groups and procedures for obtaining suggestions should be established. Focus on how the program can be made more challenging.
2. Increase expectations regarding requirements, course content, and student performance.

WAYS VOCATIONAL AND ACADEMIC TEACHERS CAN WORK TOGETHER TO PROVIDE EXTRA HELP AND ENCOURAGEMENT TO AT-RISK STUDENTS

1. Encourage "cross-over" teaching. For example, when appropriate, the English teacher could effectively teach science or math skills. This does, however, require cooperative planning.
2. Standardize procedures for identifying, establishing a plan of action, and motivating the at-risk student.
3. Encourage peer teaching. Those students who have mastered a concept could be given a certificate. Anyone who needed help with that concept would need only to find a certificated peer.
4. Provide for special help through vocational aides, a remediation center or an extended day tutorial program. Clear procedures regarding how each could be used must be established. Extra compensation would need to be provided for the tutorial program.
5. Look for alternatives to the out-of-school suspension program.

ASSISTING VOCATIONAL STUDENTS TO CONSIDER AND PURSUE A MORE CHALLENGING PROGRAM OF VOCATIONAL AND ACADEMIC STUDY

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1. Involve parents and students and assessment later in planning the student's program.
2. Make students aware of the increased expectations/requirements of potential employers. Schedule visits from industry personnel and former students. Devote bulletin board space to articles addressing these expectations/requirements.
3. Place students in the workplace earlier. A senior work-study program is sometimes too late to motivate the student to "stretch" a little harder. A summer program is one possible way to accomplish this.
4. Pay more attention to the scheduling of classes. Whenever possible, schedule classes so that students can move betweeen the academic and vocational tracks.
5. Place a greater effort on helping students establish long-term goals and try to help them do so early in their training. Help them maximize their options by choosing appropriate courses.

REWARDING AND RECOGNIZING VOCATIONAL STUDENTS WHO PURSUE MORE CHALLENGING VOCATIONAL AND ACADEMIC COURSES

1. Use special diploma seals for areas of accomplishments such as academic average, attendance, etc.
2. Work with industry to establish an award of guaranteed employment of the top student(s) in each vocational program.
3. Establish scholarships for specified accomplishments. Industry can help here.
4. Establish a "Wall of Fame" somewhere in the school to honor those who attain the highest achievement level.
5. Provide a special letter of recommendation from the superintendent for top students.
6. Establish a special section in the school's paper (maybe your local paper would be interested, too) for those deserving students.
7. Hold an Honors Banquet (quarterly or annually).
8. Publicize the student of the month (or week). This could be done by announcing on the P.A. system, on a special bulletin board, and other similar ways.

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SCHOOL DISTRICT OF OCONEE COUNTY

LICENSED PRACTICAL NURSING

TECHNICAL COLLEGE/CAREER PLAN	FOUR YEAR COLLEGE PLAN
NINTH GRADE	**NINTH GRADE**
English I	English I
Algebra I	Algebra I/Geometry
Physical Science	Physical Science
World Geography/History	World Geography/History
P.E./R.O.T.C.	P.E./R.O.T.C.
Elective	Elective
TENTH GRADE	**TENTH GRADE**
English I	English I
Geometry	Geometry/Algebra II
Principles of Technology	Biology I
Sociology/Psychology	Sociology/Psychology
Computer Applications/ Drivers Education	Computer Applications/ Drivers Education
Elective	Foreign Language
ELEVENTH GRADE	**ELEVENTH GRADE**
English III/Applied Comm.	English IV
Applied Math	Algebra II/Algebra III-Trig.
Applied Biology-Chemistry	Chemistry
U.S. History	U.S. History
Elective	Foreign Language
Elective	Elective
TWELFTH GRADE	**TWELFTH GRADE**
Applied Communications	English IV
Government/Economics	Algebra III-Trig./Physics
Elective	Government/Economics
L.P.N. I	L.P.N. I
L.P.N. I	L.P.N. I
L.P.N. I	L.P.N. I

Suggested Electives: Psychology/Sociology; Accounting; Business Office Management; Speech; Art (Performing).

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Communications

1. Spelling
2. Verbal communication-speech and telephone skills
3. Listening
4. Non-verbal communication
5. Terminology
6. Reference and Study Skills (Dictionary, Research, Library Skills)
7. Manners - social savvy
* 8. Following directions and instruction
* 9. Chain of command
10. Writing/Grammar
*11. Leadership
*12. Caring skills-assertive, nonagg. - empathy
13. Reading comprehension
14. Pronunciation
15. Punctuality
*16. Reporting skills - teamwork and organizational skills
*17. Interpretation - questioning skills
18. Confidentiality
*19. Languages - global, sign, handicapped
*20. Keyboarding/Computer Literacy

Mathematics

1. Metric System
2. Conversion
3. Basic Mathematics
* 4. Linear and Liquid Measurements (colume)
* 5. Problem solving
* 6. Conversion of time (military)
* 7. Measurements (height, weight, area)
* 8. Graph Interpretation
* 9. Basic Electricity - equations
*10. Keyboarding/Computer Literacy
11 Algebra - vectors
12. Geometry - range of motion
*13. Calculation

Science

1. Anatomy and Physiology
2. Microbiology
3. Chemistry
4. Physical Science
5. Physics
6. Pharmacology
7. Biology
8. Computer Literacy
9. Electricity
10. Genetics
11. Histology, Paracytology
12. Problem-solving
13. Immunology

*Technical Competencies

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WAYS VOCATIONAL AND ACADEMIC TEACHERS CAN WORK TOGETHER TO ADVANCE THE COMMUNICATIONS, MATHEMATICS, AND SCIENCE COMPETENCIES OF VOCATIONAL COMPLETERS

1. Provide inservice for all teachers together.
2. Provide an understanding of what health program includes.
3. Identify needs and positions for health workers.
4. Provide salary for health worker.
5. Identify objectives and course content studied in inservice by guidance counselors, vocational and academic teachers.
6. Acquire understanding of students' needs and capabilities.

IDEAS ON ASSISTING VOCATIONAL STUDENTS TO CONSIDER AND PURSUE A MORE CHALLENGING PROGRAM OF VOCATIONAL AND ACADEMIC STUDY

1. Test all students at 8th grade level.
2. Treat all students the same when scheduling. If they show an interest in health area, put into health related courses.
3. Help vocational teachers make changes in programs to meet today's demands.
4. Provide strong emphasis to vocational teachers on the importance of raising the level of vocational students competencies.
5. Promote administration, principals, guidance counselors, academic and vocational teachers to work together to form a unity to teach all students.

REWARDING AND RECOGNIZING VOCATIONAL STUDENTS WHO PURSUE MORE CHALLENGING VOCATIONAL AND ACADEMIC COURSES

1. Articulation
2. Scholarships
3. Work incentives

SCHOOL DISTRICT OF OCONEE COUNTY

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COMMERCIAL FOOD SERVICES

TECHNICAL COLLEGE/CAREER PLAN

NINTH GRADE

English I
Algebra I/Consumer Math
Physical Science
P.E./R.O.T.C.
World Geography/History
Elective

TENTH GRADE

English II
Algebra I/Geometry
Applied Biology-Chemistry
Accounting I
Computer Applications/
Drivers Education
Elective

ELEVENTH GRADE

English III/Applied Comm. I
Applied Math
U. S. History
Commercial Food Services I
Commercial Food Services I
Commercial Food Services I

TWELFTH GRADE

Applied Communications II
Government/Economics
Elective
Commercial Food Services II
Commercial Food Services II
Commercial Food Services II

FOUR YEAR COLLEGE PLAN

NINTH GRADE

English I
Algebra I/Geometry
Physical Science
P.E./R.O.T.C.
World Geography/History
Elective

TENTH GRADE

English II
Algebra II/Geometry
Biology I
U.S. History
Computer Applications/
Drivers Education
Elective

ELEVENTH GRADE

English III
Algebra II/Algebra III/Trig.
Chemistry
Commercial Food Services I
Commercial Food Services I
Commercial Food Services I

TWELFTH GRADE

English IV
Government/Economics
Algebra III/Trig./Elective
Commercial Food Services II
Commercial Food Services II
Commercial Food Services II

Suggested Electives: Foreign Language; Industrial Technology; Principles of Technology; Economics; Psychology/Sociology; Business Management and Entrepreneurship; Accounting; Speech; Art; Foods and Nutrition; Business Law.

COMPETENCIES NEEDED FOR RELATED EMPLOYMENT AND POSTSECONDARY EDUCATION IN FOOD SERVICE

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Communications

(Should be taught in all curricula areas)

Students should demonstrate skills in the following areas:

1. Basic oral and writing
2. Reading (9 to 11 grade minimum)
3. Listening
4. Interpersonal and group relationships
5. Completing an application/interview
6. Reading beyond textbooks

Mathematics

Students should demonstrate skills in the following areas:

1. Basic computational (addition, subtraction, multiplication, and division of whole numbers, fractions, and decimals
2. Measurement
3. Percentage
4. Ration/proportion
5. Metric system
6. Consumer mathematics
7. Problem solving
8. Equations
   Practical application

Science

Students should demonstrate knowledge of the following areas and their applications:

1. Basic hygiene
2. Health and safety regulations
3. Electricity (to include transfer of energy)
4. Nutrition
5. Plants and animals (to include patterns of growth, common diseases, and proper care)
6. Metric system
7. Basic chemistry (to include understanding of chemical reactions and hazardous chemicals)

Technical

Students should demonstrate skills in the following areas:

1. Keyboarding
2. Use of computers
3. Recordkeeping
   Social interaction

WAYS VOCATIONAL AND ACADEMIC TEACHERS CAN WORK TOGETHER TO ADVANCE THE COMMUNICATIONS, MATHEMATICS, AND SCIENCE COMPETENCIES OF VOCATIONAL COMPLETERS

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1. Common staff development
2. Release time for observation
3. Exchange of common materials
4. Common social gatherings

DEVELOPING AND IMPLEMENTING A MORE CHALLENGING PROGRAM OF VOCATIONAL AND ACADEMIC STUDY

1. Identify basic competencies required for progress in career ladder by meeting with representatives from postsecondary, vocational, and non-vocational schools.
2. Analyze current curriculum and design changes based upon input from:
   a. Vocational, non-vocational teachers
   b. Counselors and administrators
   c. Former students (higher education and work force)
3. Provide staff development to introduce changes in curriculum.
4. Implement changes with constant monitoring, adjusting, and evaluating.

ASSISTING VOCATIONAL STUDENTS TO CONSIDER AND PURSUE A MORE CHALLENGING PROGRAM OF VOCATIONAL AND ACADEMIC STUDY

1. Individual counseling with parent and student beginning early in school career (no later than eighth grade).
2. Publicizing reports from technical schools, indicating course prerequisites and failure rates.
3. Continued encouragement from both vocational and non-vocational students.
4. Having community and business leaders visit classes periodically to stress the need for a more rigorous course selection.

WAYS VOCATIONAL AND ACADEMIC TEACHERS CAN WORK TOGETHER TO PROVIDE EXTRA HELP AND ENCOURAGEMENT TO AT-RISK STUDENTS

1. Use teachers as counselors for at-risk students.
2. Provide paid or unpaid peer coaching.
3. Provide release time during day for help from student support groups or teachers who can offer tutoring.
4. Provide staff development in teaching communications throughout the curriculum.

ND RECOGNIZING VOCATIONAL STUDENTS WHO PURSUE ALLENGING VOCATIONAL AND ACADEMIC COURSES

1. ship funds based on more challenging courses.
2. articulation agreements with tecnical schools.
3. ffers from business and industry to reward for ner courses.
4. nts who take more challenging courses.

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SCHOOL DISTRICT OF OCONEE COUNTY

BUSINESS EDUCATION

TECHNICAL COLLEGE/CAREER PLAN

NINTH GRADE

English I
Pre Algebra/Algebra I
Physical Science
World Geography/History
P.E./R.O.T.C.
Computer Applications I

TENTH GRADE

English II
Business Math
Principles of Tech/
  Applied Biology/Chem.
Computer Applications II
Accounting I
Elective

ELEVENTH GRADE

English III
Applied Math
U. S. History
Business Ed. Elective
Business Ed. Elective
Elective

TWELFTH GRADE

Applied Communications
Government/Economics
Elective
A.O.I.S./Cooperative Ed.
A.O.I.S./Cooperative Ed.
A.O.I.S./Cooperative Ed.

FOUR YEAR COLLEGE PLAN

NINTH GRADE

English I
Algebra I/Geometry
World Geography/History
P.E./R.O.T.C.
Physical Science
Elective

TENTH GRADE

English II
Algebra II/Geometry
Biology I
Foreign Language
Accounting I
Elective

ELEVENTH GRADE

English III
Algebra III/Trig.
*Science Elective
Foreign Language
U. S. History
Elective

TWELFTH GRADE

A.O.I.S./Marketing Ed.
A.O.I.S./Marketing Ed.
A.O.I.S./Marketing Ed.
English IV
Math Elective
Government/Economics

Suggested Electives: Art, Computer Applications, Computer Science, Drivers Ed., Business Law, Accounting II, Psyc/Sociology, Industrial Tech.

* Chemistry I, Physics

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COMPETENCIES NEEDED FOR RELATED EMPLOYMENT AND POSTSECONDARY EDUCATION IN ACCOUNTING

Communications

Students should demonstrate skills in the following areas:

1. Writing
2. Comparing
3. Document interpretation
4. General and technical reading
5. Following oral and written instructions
6. Research
7. Grammar, including spelling, punctuation, vocabulary
8. Organizing
9. Information transfer
10. Verbal communication
11. Critical thinking

Mathematics

Students should demonstrate skills in the following areas:

1. Basic computations
2. Basic algebra
3. Logical thinking
4. Business applications
5. Basic statistics
6. Accuracy
7. Using calculators and computers

Science

Students should demonstrate understanding of the following:

1. Scientific method
2. Reasoning
3. Logical thinking
4. Problem solving

5. Office product characteristics and potential impact on working environment
6. Environmental impact on office equipment
7. Employee health and safety factors
8. Ergonomics

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Technical

Students should demonstrate the following:

1. Employability skills
2. Keyboarding skills
3. Basic computer operation skills
4. Basic and advanced accounting theory and application skills
5. Office equipment (non-computer) operations skills
6. Computerized accounting skills
7. Basic understanding/application of business law and business ethics.

WAYS VOCATIONAL AND ACADEMIC TEACHERS CAN WORK TOGETHER TO ADVANCE THE COMMUNICATIONS MATHEMATICS, AND SCIENCE COMPETENCIES OF VOCATIONAL COMPLETERS

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1. Select a coordinator and advisory committee (ideally the committee should consist of academic and vocational teachers, administrators, and local business people).
2. Hold an open house in the vocational department for the academic teachers to become acquainted with vocational programs.
3. Provide time during the school year for cooperative planning on a regular basis--at least once a month.
4. Plan joint in-service programs during the year.
5. Hold a retreat for planning activities to promote teachers working together.
6. Have vocational and academic teachers correlate course competencies.
7. Develop a simple form that teachers can use to communicate.
8. Develop an end of the year survey which includes requests for suggestions.

DEVELOPING AND IMPLEMENTING A MORE CHALLENGING PROGRAM OF VOCATIONAL AND ACADEMIC STUDY

1. Promote better understanding between the total faculty and administration through an interdisciplinary team approach.
2. Determine a sequence of courses that promote the integration of academic and vocational courses and competencies.
3. Develop a program of study that meets the needs of students, while at the same time prepares them to be an active participant in the work force now and in the future.
4. Promote staff development that provides the most recent research on building success for teachers and students in the classroom.
5. Be prepared to meet the individual differences of students from both a learning and social environment.
6. Establish selection criteria for students utilizing a school-based management approach.
7. Provide necessary resources to teachers to develop and implement programs.

Implementation Plan

1. Build a network in K-12 for the purpose of promoting the following:

    a. career education
    b. vocational skill awareness
    c. academic integration

2. Have teachers from the high school and middle schools visit the elementary schools to assist elementary teachers in math, science, English, and technological education.
3. Bring elementary students to the high school to utilize the various computer-assisted labs. Provide students with a

practical application experience in the science lab. Also include in this visitation experiences in writing and reading.

4. Have elementary teachers work with high school teachers to develop activities to reinforce the skills the students utilized in their high school visit and to provide a more challenging math and science curriculum for the elementary grades.
5. Expose all students at all grade levels to career education materials to provide a basis for four-year plan implementation. (This would also include integration of vocational skills at an earlier age.)
6. Provide teachers with time for planning classroom visitations and developing reinforcement materials for elementary grades.
7. Expect the following results of this type of interaction and integration of K-12 education:
   a. a more positive attitude for students about school;
   b. reduction in dropouts;
   c. more access to higher-level courses for minorities;
   d. increase in female enrollments in higher-level math, science and technology education;
   e. improved reasonings and writing skills for students;
   f. increased collegiality among teachers of K-12.
8. Design, select, and implement an assessment program for eighth grade students in order to assist vocational students to consider and pursue a more challenging program of vocational and academic study. Consider the following steps:

   a. Solicit support of superintendent, school governing agencies, local school administrators, guidance counselors, teaching staff, and parents.
   b. Select assessment instruments that will measure aptitude and interest of eighth grade students.
   c. Employ and provide in-service for persons who will administer and evaluate test results.
   d. Implement the assessment program.
   e. Appropriate person to facilitate the results to guidance counselors. Have guidance counselors utilize findings in assisting students and parents in developing more meaningful courses of study which includes academic and vocational courses.

WAYS VOCATIONAL AND ACADEMIC TEACHERS CAN WORK TOGETHER TO PROVIDE EXTRA HELP AND ENCOURAGEMENT TO AT-RISK STUDENTS

1. Individualized assessment and planning for the "at-risk" student.
2. Peer tutoring, possibly by honor students. Plan this as a teacher guided assistance program, directed by teachers monitoring study skill lab.
3. Parental involvement (home visits, follow through with homework assignments and attendance guides).
4. Use of in-school suspension or alternate school suspension.
5. Setting career aspirations.
6. Scheduling courses focusing on employable skills.

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7. Follow-up plan of monitoring by counselors through plan of action for each student, involving keeping a log.
8. Mentor involvement with the establishment of advisory councils to include business members, civic groups, and educators.
9. Career awareness promotion to include programs, activities, fairs, exhibits, resource business people, industry involvement, partnerships, collaboration with business leaders.
10. Assessing test scores to remediate skills needed.
11. Flexible scheduling.
12. Strict attendance policy with monitoring "make up" time on Saturday with assigned work for the students.
13. Assigning a peer partner to provide counseling and motivation. Peer partner must be trained through workshops.
14. Set higher expectations with awards and incentives, recognitions, banquets, school assemblies, community groups.
15. Focus on teen parenting though family life education programs.
16. Group counseling with increased use of positive forms of motivation (videos and talk sessions) for continuing postsecondary education with emphasis on admissions requirements and financial aid.

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REWARDING AND RECOGNIZING VOCATIONAL STUDENTS WHO PURSUE MORE CHALLENGING VOCATIONAL AND ACADEMIC COURSES

1. Student of the Month
   a. Have vocational departments select a coordinator.
      - o Meet monthly with the different vocational departments to select student of the month.
      - o Have coordinator and teachers develop criteria for student selection (criteria made up of: attendance, records, higher-level vocational and academic courses where grades will not be the only factor used.)
   b. Solicit suggestions for student of the month award:
      - o special parking spot
      - o school bulletin board recognition
      - o T-shirt or visor awarded
      - o pencils, notebooks, other school supplies
      - o coupons for special meals, desserts, etc., within school
      - o special business awards - meals, tapes, etc.
      - o passes to sports events

2. Student of the Year
   a. Let all "students of the month" be eligible for this award.
   b. Have recognition coordinator meet with vocational teachers from all departments to make this selection.*
   c. Suggestions for Student of the Year award.
      - o Plaque presented in annual honors assembly
      - o Letters of recognition on permanent record
      - o Name added to permanent plaque kept in trophy case
      - o Award of scholarship if funds are available (from area business)

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*When this selection is made, the committee should bear in mind that this awards program is to recognize vocational students who pursued more challenging academic and vocational courses. The records of all students of the month should be reviewed carefully.

approved 6/4/90

MCDUFFIE HIGH SCHOOL/CAREER CENTER AND TRI-COUNTY TECHNICAL COLLEGE

TECHNICAL ADVANCED STUDY

I. PURPOSE

Technical Advanced Study (TAS) will function as an expanded component of McDuffie High School and Career Center's Tech Prep program. The purpose is to:

- reward high school students who've achieved specified vocational, academic and high school requirements by providing opportunities for them to enroll in Tri-County Technical College (TCTC) courses during their senior year;
- encourage students to "get a head start" on college studies;
- encourage students to utilize fully their senior year of high school;
- serve as a motivational and dropout prevention initiative.

II. CONDITIONS AND PROCEDURES

A. Selection of TAS Students.

1. McDuffie staff will identify prospective TAS students based on:
    - successful completion of high school vocational studies;
    - successful completion of the majority of requirements for high school graduation;
    - potential for success in college courses.
2. McDuffie and TCTC staff will identify appropriate college-level occupational courses in which TAS students may enroll. The following conditions will be considered:
    - students' potential for earning Technical Advanced Placement credit (ensuring that students do not register for courses that they may qualify to exempt);
    - students' academic and vocational background (ensuring that students have a reasonable chance for success in college courses);
    - scheduling issues for the high school and the college.

3. TAS students will be permitted to take only one course (and its designated co-requisite, if appropriate) for the fall quarter while they are concurrently enrolled at McDuffie High School and Career Center.

4. Students will receive information explaining that participation in TAS does not obligate them in any way to enroll at Tri-County for subsequent quarters during their senior year or following high school graduation.

5. Students participating in TAS will follow TCTC's policies for under-age admission:

   - permission forms from parents/guardians and the high school principal will be on file in the college admissions office prior to registration;

   - students will be "admitted" to Tri-County in the special student classification (i.e., non-degree seeking);

   - TAS students will be exempt from placement testing and admissions procedures. (If students decide to enroll at Tri-County after high school graduation, all admissions procedures will apply at that time).

6. For the 1990-91 school year, McDuffie students will be "released" to take morning classes at TCTC. However, students may be permitted to take courses at other times of the day if appropriate TCTC courses cannot be identified during morning hours.

7. Prior to TCTC's pre-registration for winter and spring quarters, McDuffie staff will determine whether or not currently enrolled TAS students will be approved to take additional courses.

8. Prior to TCTC's pre-registration for winter and spring quarters, McDuffie staff will determine whether or not additional students will be approved to participate in TAS.

B. Attendance.

1. It will be the responsibility of each student to attend TCTC classes regularly and to abide by all rules, regulations, and policies of the college and as outlined in the course syllabi.

2. Students will be expected to attend class sessions in accordance with TCTC's academic calendar (i.e., there may be days where TCTC is holding classes but McDuffie is not in session.)

C. Credit Issues.

1. Students will not earn high school credit for enrolling in college courses. However, college coursework will be listed on high school transcripts showing participation in TAS. (Note: In certain cases, students may earn both high school units and college credits provided college coursework meets all criteria outlined by the State Department of Education and the Board of Trustees for Anderson School District Five.)

2. Students will generate an official TCTC transcript reflecting coursework, grades and college credit hours earned.

3. Students will receive quarterly grade reports from the college. (These grade reports will be mailed directly to the students in accordance with college policy.)

D. Insurance, Parental Permission Statements, and Transportation.

1. There will be no additional insurance coverage from Anderson School District Five for students participating in Technical Advanced Study.

2. Students will also be covered against accidents to and from Tri-County Technical College and while on the TCTC campus under the college's insurance policy. (A $4.00 insurance fee is automatically assessed as part of the tuition payment. The insurance limit is $5,000 per claim.)

3. Parents/guardians will be required to sign a permission form from McDuffie High School indicating approval for their children to participate in TAS.

4. Parents/guardians and students will also be required to sign a permission form from Tri-County Technical College indicating approval in two areas: 1) permission for the student to take a college course (fulfilling one requirement of "special student admission" for under-age students), and 2) approving the release of information** on the student's progress and grades in college courses to appropriate McDuffie High School and district office personnel.

5. TAS students will be required to provide their own transportation to and from the Tri-County Technical College campus.

** Students must also sign this form so information can be released should the student turn 18 during his participation in TAS.

E. Costs.

1. Students will be responsible for paying all costs associated with TAS (tuition, books, registration and insurance fees, parking fee).

F. Student Information.

All TAS students will receive an information packet and will participate in a special orientation program conducted by TCTC personnel.

1. During May of their junior year, students selected for TAS will receive an information packet containing:

   - course information (course title and description, credit hours, times and days the course/lab will meet), starting and ending dates of the quarter, and, if available that far in advance, information on building and room location where the course will be taught and the instructor's name;

   - listing of all costs associated with the course and participation in TAS (tuition, registration/insurance fees, textbook, .25 parking fee) and date that all costs must be paid;

   - date, time, and location of special orientation program for TAS students and a general description of what the program will cover;

   - explanation of their responsibilities as TAS students;

   - TCTC insurance information;

   - name, phone number and office location of TAS coordinators on the TCTC campus;

2. Prior to registering for college courses, TAS students will be required to participate in a special orientation program. The program will include:

   - introduction of college instructors and TAS coordinators;

   - explanation of how, when, where to register for courses;

   - explanation of what to expect in taking college courses (attendance, time required to complete out-of-class assignments, lab policies, etc.)

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- description of all TCTC services available to them as TAS students (library, bookstore, cafeteria, tutoring, counseling*, etc.);
- tour of classrooms and labs;
- explanation of how to buy textbooks and parking decals and where they can park;
- how they can use their college credit for TCTC degree programs and what they should do if they plan to use their credit at another technical college;
- explanation of when they will receive grade reports, how to request college transcripts, and what they should do if they decide to enroll at TCTC after high school graduation.

III. AREAS OF RESPONSIBILITY

A. McDuffie High School personnel.

1. Identify potential TAS students, provide students with appropriate background information.
2. Meet with TCTC staff to select appropriate college courses for students.
3. Inform students of their selection to participate in TAS and review with them courses they have been approved to take; discuss with students their responsibilities for participation.
4. Conduct informational meetings with parents.
5. Coordinate process for parental permission forms enabling students to participate.
6. Conduct follow-up with students and/or parents should any problems be identified concerning students' progress in college courses.

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* Because TAS students are still high school students, they will continue to receive all services associated with McDuffie and will be encouraged to remain active in high school events. However, TAS students will also have access to any service provided by TCTC to on-campus students. (Any counseling that is required related to students skipping classes or performing poorly will be handled by McDuffie staff.)

B. Tri-County Technical College personnel.

1. Identify TAS coordinators (Rick Murphy, PACE, and David Shirley, assistant dean of students, TCTC) who will be responsible for the following:

   - develop information packets for students;
   - develop student/parent permission form indicating approval to take a Tri-County Technical College course and to release information on student's progress to high school and district officials;
   - develop and conduct orientation program for students (and work with McDuffie staff on when, where orientation will be held);
   - work with TCTC division chairmen, department heads and instructors to help identify appropriate TCTC courses for TAS students; inform TCTC personnel of the names of participating students and which courses they will be taking;
   - assist McDuffie staff, if requested, in conducting informational meetings with parents;
   - serve as contact persons for TAS students to help them with any questions, problems, or concerns they may have while on the TCTC campus;
   - maintain close contact with TCTC instructors of TAS students, inform principal of McDuffie of any problems;
   - track students' progress and develop written reports back to McDuffie's principal, district officials and TCTC administrators on students' grades at the end of the quarter.

C. PACE personnel.

1. Serve as liaison between McDuffie and TCTC personnel in the development, implementation, and evaluation of TAS.
2. Assist McDuffie staff in developing promotional materials for TAS.
3. Assist McDuffie staff, if requested, in conducting informational meetings with parents.
4. Assist in the development and dissemination of evaluation reports.

IV. EVALUATION

1. Students' performance in college courses will be reported to the principal of McDuffie High School, district officials and TCTC administrators at the end of each quarter.

2. PACE and TCTC staff will design a brief questionnaire for students to evaluate their perceptions of participation in TAS.

3. During April, 1991, representatives of McDuffie High School, Anderson District Five, Tri-County Technical College, and PACE will meet to evaluate the effectiveness of TAS, identify areas for improvement and/or to determine whether or not the program should be continued.

(revised 5/28/90)

Approved 6/4/90 by:
Anderson School District Five
Tri-County Technical College

6A Anderson Independent-Mail, Thursday, July 19, 1990

Editorial

Bold thinking

An innovative, career-oriented education program is being introduced in South Carolina

Once in a while an item surfaces about schools that doesn't deal with finances or education politics. When it does, to quote the elderly Indian character in "Little Big Man," a film of some years ago starring Dustin Hoffman, it cause our hearts "to soar like an eagle."

Finances are important. So are the sometimes aggravating outcroppings of school politics. But we are leaning more and more toward the idea that innovation is what is needed to modernize the schools.

A story on Monday explained a new program offering specific career training to high school students instead of abstract knowledge offered in general education programs, which sometimes graduate students without skills that can be translated into good jobs. The general education curriculum comes between college preparatory and vocational education, and the career-specific plan — called tech prep — is aimed at offering students an opportunity to prepare for jobs.

Tech prep aims at a group of students who are disinclined to sit through course after course which they cannot relate to their goals in life. The future automobile mechanic, for example, may be excessively restless in a course on ancient history while his college-bound counterpart may see its value. Given enough of these courses, the would-be mechanic may lose all interest in school and leave before he gets his diploma.

Why not tailor the program to his values, his needs?

That's what the career-specific programs are offering. They focus on work skills and the practical application of knowledge.

Our excitement over such innovative programs derives from some statistics we saw recently. They showed that graduates of South Carolina's technical high schools have a higher rate of employment and draw better pay than their counterparts than some other students.

In addition, there is a correlation with the career-specific programs in the state's technical colleges. Some exciting things are happening in that regard in the Upstate.

Tri-County Technical College in Pendleton has a program that involves schools in Anderson, Oconee and Pickens counties that smooths the transition from high school to higher education in technical areas. McDuffie, Westside and Hanna teachers are involved.

Applied English and mathematics courses — those that relate to specific vocations — are being offered now. Applied physics courses are available, and applied biology and chemistry courses may be offered later.

A step is being taken now to get the tech prep movement into middle schools so that eighth graders can become involved in education plans that are taking them into specific job areas. A student who becomes involved in such a plan understands why he's taking algebra I, for example, and doesn't have the negative attitude that says, "Oh, well. I have to take it." There is a major difference.

McDuffie may be the first vocational high school in the state to allow qualified seniors to take courses at a technical college — in this case, Tri-County — in their senior year. They are high school and college students at the same time.

It seems to us that much of public education has become stuck in a well-worn groove which is producing too many dropouts and too many graduates unprepared for much of anything in the way of a career.

Parents blame teachers and administrators. Teachers blame parents for not providing a home environment in which education is valued. Everybody blames the prevalence of drugs.

It would be very innovative, we think, if all those critics got together and asked the students what they want — and don't want. That could be very illuminating.

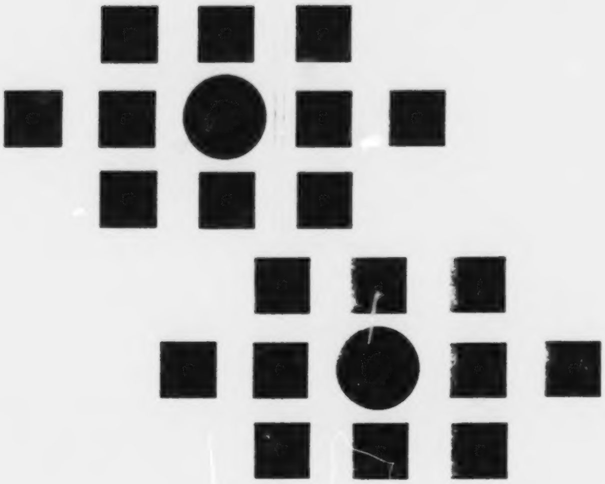
In any event, innovative programs in vocational education in the Upstate are breaking some of the rigid mold that has contained schools in pattern that may have been good for the middle of the 20th Century but aren't nearly as relevant to students' needs as we near the end of the decade.

We are genuinely pleased with the progress.

APPENDIX J

Guide to Area Business Speakers

...a resource for teachers and counselors



Published by
The Partnership for Academic and Career Education (PACE)
P. O. Box 587
Pendleton, SC 29670
(February, 1990)

BEST COPY AVAILABLE

GUIDE TO AREA BUSINESS SPEAKERS
...A RESOURCE FOR TEACHERS AND COUNSELORS

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INTRODUCTION

ABOUT THE PARTNERSHIP FOR ACADEMIC AND CAREER EDUCATION...

Established in 1987, the Partnership for Academic and Career Education (PACE) is a business-education organization involving the seven school districts in Anderson, Oconee, and Pickens counties, the National Dropout Prevention Center at Clemson University, Tri-County Technical College and representatives from local businesses. The PACE partnership is leading an initiative to bring Tech Prep (PREParation for TECHnologies) programs to area schools.

Tech Prep programs are designed to link secondary and postsecondary education, blending academic and vocational studies, to prepare students for mid-level technology careers in industrial/engineering technology, health, business, and public service fields.

While the Tech Prep movement is relatively new to the tri-county area, similar programs have been developing throughout the United States since the early 1980's. There are now over one-hundred Tech Prep programs in 33 states involving community colleges and public schools.

ABOUT THE SPEAKERS GUIDE...

The PACE staff published this Guide to provide teachers and counselors with greater access to the expertise and insights of local business professionals. By having business people share their experience and knowledge with student groups, students should have a better understanding of the importance of staying in school, applying themselves in the classroom, and preparing for a more technically-oriented workplace.

HOW TO USE THE SPEAKERS GUIDE...

The Guide contains sections listing suggestions for teachers, counselors, and speakers which should help ensure a satisfactory experience for all concerned.

The Guide is also color-coded so teachers and counselors can easily identify speakers from various business categories:

- o manufacturing and technical areas are printed on yellow paper;
- o health and health-related areas are printed on pink paper;
- o business (retailing, small business, and other non-manufacturing areas) are printed on gray paper;
- o public service areas are printed on green paper.

NOTE: BECAUSE MANY SPEAKERS ARE WILLING TO DISCUSS TOPICS NOT DIRECTLY RELATED TO THEIR TYPE OF BUSINESS, TEACHERS AND COUNSELORS

MAY WANT TO LOOK THROUGH THE ENTIRE GUIDE BEFORE SELECTING A SPEAKER. ALSO, BECAUSE THE COMPANIES OF SEVERAL SPEAKERS ARE DIVERSE, DATA SHEETS FOR THOSE SPEAKERS HAVE BEEN INCLUDED IN MORE THAN ONE OF THE COLOR-CODED CATEGORIES.

EVALUATION OF THE GUIDE...

PACE is interested in hearing from teachers, counselors, and speakers concerning the effectiveness of the Guide and the improvements that are needed for future editions.

Contained in this booklet are two evaluation forms for teachers/counselors and speakers. These evaluation forms may be completed and returned to PACE at any time--the results will be used to determine whether or not the project should be continued and what changes are needed to make the Guide more useful.

HOW TO OBTAIN ADDITIONAL COPIES...

Additional copies of the Guide to Area Business Speakers may be obtained by contacting:

Rick F. Murphy
PACE Counselor Liaison and Director of Cooperative Education
P.O. Box 587
Pendleton, SC 29670

(646-8361, ext. 2381 or toll-free: 225-2250, 882-4412, 859-7033)

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SUGGESTIONS FOR TEACHERS AND COUNSELORS IN USING GUEST SPEAKERS

In order to ensure a satisfactory experience for you, your students, and your guest speaker, the following suggestions may be helpful:

* Follow all school and district policies regarding the use of outside speakers.

* Select a speaker who you feel will properly address issues related to the class and the interests of students. If possible, have students participate in the selection of the speaker. (Students may be more interested in a speaker if they feel they've been involved in the selection process.)

* Call the speaker directly and indicate that you found his/her name listed in the PACE Guide to Area Business Speakers. After you've established the date and time(s) for the visit, send your speaker a written confirmation.

* When you contact the speaker, you might also discuss:
    - -the topics you'd like the speaker to address;
    - -any information about the class, what the students are studying, etc. that would help the speaker understand something about your students and their interests;
    - -whether or not any audio visual equipment will be needed;
    - -directions to the school and instructions on where the speaker should go when he/she enters the school. (If possible, it might be helpful to reserve a convenient parking space for your speaker and to have someone meet him/her when he arrives at the school.)

* Prepare your students for the visit by having them read appropriate information in advance. (For example, you might ask the speaker if any material on his/her company could be provided so your students could review it before the visit) or by having students develop questions they'd like to ask the speaker during the presentation.

* Consider preparing an evaluation instrument to gather student reactions. This should provide useful feedback for you and the speaker.

* Check to see that the room for the presentation has been properly prepared. If you are using a large room such as a gymnasium, make sure all students will be able to hear as well as see the speaker. Check to be sure that any requested audio-visual equipment has been properly set up and is in working order.

* Always have a sufficient number of teachers and/or counselors present during the presentation. (This can help your speaker feel more at ease as some first-time speakers may be somewhat apprehensive about addressing student groups.)

* Consider video-taping the presentation to use with other student groups. (Since some people are not comfortable being videotaped, you might want to discuss this possibility with your speaker in advance.)

SUGGESTIONS FOR GUEST SPEAKERS

Visiting a class or student group can, and should be, a very rewarding experience for you and the students! Listed below are several ideas that may be useful to you in preparing for a classroom presentation or discussion.

* When a teacher or counselor contacts you about speaking to a student group, you should mutually agreed on the topics for discussion. (Ideally, your comments should address something the students are studying or should involve topics the teacher or counselor wants students to understand.)

* Be sure to ask the teacher or counselor about making arrangements for any audio-visual equipment you might need to have set up and that you know:

  - o how to get to the school and where you should park;
  - o where you should go when you arrive (usually a guest needs to report to the office first);
  - o directions to the room where you'll make your presentation or whether someone will be available to take you to the meeting room when you arrive.

* If possible, you might offer to send brochures or other materials relating to your company or topic that could be shared with students ahead of time. (This may help to encourage more student participation and involvement when you visit the class.)

* Give the teacher or counselor any additional information you'd like him/her to have about you, or your company, so you can be properly introduced to the students.

* When presenting information it's usually a good idea to give a brief overview of the topics you'll be covering and to leave time to summarize the major points at the end of the presentation.

* Whenever possible, try to use visual aids in your presentation (overhead transparencies, handouts, posters, videos, etc.) and include opportunities for students to be actively involved in the presentation. (This could be as simple as asking students questions or having them involved in a demonstration.)

* Discuss with the teacher/counselor ways you might receive feedback about your presentation.

* And finally, use this as an opportunity to learn more about your audience-- ask questions! Most students will appreciate the opportunity to tell you about themselves.

DATA SHEET

PACE Speaker's Guide

SECTION I Name Evelyn C. Kay Office Phone 226-8515

Title General Manager/Personnel Company or Agency American Sentry Alarm Co.

Company Address 1212 N. Fant Street, P.O. Box 743, Anderson, SC 29622

Brief description of what your company/agency does: Design and install Security Systems (Burglar, Fire, Holdup, Closed Circuit Television, (Communications Company with Telephone Answering Service Paging Service, and Mobile Phones

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested

☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: ____________________)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☒ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s): ____________________)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: ____________________

DATA SHEET

PACE Speaker's Guide

SECTION I Name Mark Keeney Office Phone 260-7618

Title Training & Development Administrator Company or Agency BASF

Company Address P.O. Drawer 3025 - Anderson, SC 29624

Brief description of what your company/agency does: Production of man-made fiber, which is used in the home furnishings and apparel industry.

Preference for speaking times: ☐ mornings ☐ afternoons ☐ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

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☐ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

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☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: Possible freebies/Slide program

DATA SHEET

PACE Speaker's Guide

SECTION I Name David Everette Davis Office Phone 338-5711

Title Personnel Manager Company or Agency Belton Industries, Inc.

Company Address P.O. Box 127, Hamby Road, Belton, SC 29627

Brief description of what your company/agency does: Polypropylene plastic woven material for use in furniture, construction, and landscaping/

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested

☒ prefer to speak for one or two class periods ☒ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

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☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name James A. Stradling Office Phone 803-855-1885

Title Plant Manager Company or Agency Bes-Pac, Inc.

Company Address P.O. Box 1020, Easley, S.C. 29641

Brief description of what your company/agency does: Manufacture Metal Containers and Compactors for the Refuse Industry.

Preference for speaking times: ☐ mornings ☐ afternoons ☑ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: ________________)

☑ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

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☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☑ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s): ________________)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: ________________

DATA SHEET

PACE Speaker's Guide

SECTION I Name Will Nunnally Office Phone (803) 647-1119

Title Staff Manager - Administrator Company or Agency Cascade Corporation

Company Address 7040 S. Highway 11, Westminster, SC 29693

Brief description of what your company/agency does: Manufactures forklift attachments

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested

☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: ______)

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☐ Other topics. (Please indicate topic area(s): ______)

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☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: ______

DATA SHEET
PACE Speaker's Guide

SECTION I Name Tom Freeman Office Phone 803-639-2491

Title Director of Human Resources Company or Agency Central Textiles, Inc.

Company Address 311 Mill Avenue, Central, SC 29630

Brief description of what your company/agency does: Textile industry

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested

☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

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☒ Discussing attributes that your company looks for in potential employees.

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DATA SHEET

PACE Speaker's Guide

SECTION I Name Tom George Office Phone 843-1162

Title Personnel Manager Company or Agency Champion Spark Plug Company

Company Address P.O. Box 686, Liberty, SC 29657

Brief description of what your company/agency does: Manufactures aviation spark plugs and igniters

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested

☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

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☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: ____________________

DATA SHEET

PACE Speaker's Guide

SECTION I Name Bob Heineck Office Phone 885-4005

Title Electrical Engineering Supervisor Company or Agency Duke Power-Construction & Maint.

Company Address P.O. Box 219, Seneca, SC 29679

Brief description of what your company/agency does: Power generation facility engineering, construction, maintenance and upgrading.

Preference for speaking times: ☒ mornings ☐ afternoons ☐ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Engineering, Technical)

☑ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☑ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name Coleman C. Jennings Office Phone 885-3294

Title Station Emergency Planner Company or Agency Duke Power - ONS

Company Address P.O. Box 1439, Seneca, SC 29679

Brief description of what your company/agency does: Electric Utility

Preference for speaking times: ☒ mornings ☐ afternoons ☐ mornings or afternoons depending on date requested

☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name Fred Linsley Office Phone 885-3132

Title Engineer Company or Agency Duke Power

Company Address Oconee Nuclear Station, P.O. Box 1439, Seneca, SC 29679

Brief description of what your company/agency does: Operates and Maintains Oconee Nuclear Station

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Maintenance technician, Construction worker)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☒ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☒ Other topics. (Please indicate topic area(s): Due to the increase in minimum wage and advanced technology, unskilled labor jobs are disappearing. This type of work is being done more and more by machines and robotics.)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET
PACE Speaker's Guide

SECTION I Name Bill McAlister Office Phone 885-3100

Title Engineering Supervisor I Company or Agency Duke Power, ONS

Company Address Oconee Nuclear Station, P.O. Box 1439, Seneca, SC 29679

Brief description of what your company/agency does: Electric Utility - Nuclear Power Generation

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Electrical Engineering/Engineering Management)

☐ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name James (Jim) A. Long Office Phone 885-3201

Title General Supervisor Radiation Protection Company or Agency Duke Power Company/Oconee

Company Address P.O. Box 1439, Seneca, SC 29679

Brief description of what your company/agency does: Electrical Power production/electrical power transmission/electrical power distribution with related services.

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☒ Other topics. (Please indicate topic area(s): Military service, Navy, Submarine service, nuclear power)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name John R. Perkins, Jr. Office Phone 885-3354

Title Assistant Maintenance Engineer Company or Agency Duke Power Company

Company Address Oconee Nuclear Station, Seneca, SC 29679

Brief description of what your company/agency does: Oconee Nuclear Station generates approximately 25% of Duke Power's entire electrical output.

Preference for speaking times: ☐ mornings ☒ afternoons ☐ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☒ Other topics. (Please indicate topic area(s): Why it is never "too late" to get serious about schoolwork; high school or post-grad.)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: Possibly videotapes, demos to show what Duke Power does. Get them to come to World of Energy Center at Oconee.

DATA SHEET
PACE Speaker's Guide

SECTION I Name George C. O'Neal Office Phone 885-3334

Title Nuclear Production Engineer Company or Agency Duke Power Company

Company Address Oconee Nuclear Station, Seneca, SC 29679

Brief description of what your company/agency does: Public Utility

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET
PACE Speaker's Guide

SECTION I Name Jimmy J. Sevic Office Phone 885-3222

Title Chemistry Manager Company or Agency Duke Power Co., ONS

Company Address P.O. Box 1439, Seneca, SC 29679

Brief description of what your company/agency does: Production and distribution of electrical power

Preference for speaking times: ☐ mornings ☐ afternoons ☐ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: environmental, chemistry, management/supervisory)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☒ Other topics. (Please indicate topic area(s): Environmental Studies and Environmental Features of Duke Power Lakes, Biology of Lakes, Radiological Environmental Monitoring and Wildflowers of mountains and Piedmont of Carolinas.)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET
PACE Speaker's Guide

SECTION I Name Ken Rohde Office Phone 885-3282

Title Nuclear Production Engineer Company or Agency Duke Power

Company Address Oconee Nuclear Station, P.O. Box 1439, Seneca, SC 29679

Brief description of what your company/agency does: Electric Utility

Preference for speaking times: ☐ mornings ☐ afternoons ☐ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☒ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Electronic Engineering)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

Prefer Pickens County - Live in Liberty

DATA SHEET
PACE Speaker's Guide

SECTION I Name World of Energy Office Phone 885-4600

Title ______ Company or Agency Duke Power Company

Company Address P.O. Box 1687, Clemson, SC 29633

Brief description of what your company/agency does: Provide Information to the public on all aspects of Duke Power's Operation's

Preference for speaking times: ☒ mornings ☒ afternoons ☒ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: ______)

☐ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☒ Other topics. (Please indicate topic area(s): Basic Electricity; Electric Safety; Generation & Transmissic Nuclear Power; Protecting the Environment (for Oconee & Pickens Counties only))

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: ______

DATA SHEET

PACE Speaker's Guide

SECTION I Name Buddy R. White Office Phone 885-2810

Title Equipment Data Base Rep. Company or Agency Duke Power

Company Address Seneca, SC 29679

Brief description of what your company/agency does: Produces electricity

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☐ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name Tommy D. Mills Office Phone 885-4002

Title Engineering Manager Company or Agency Duke Power Company

Company Address P. O. Box 219 Seneca, SC 29679

Brief description of what your company/agency does: Provides electrical service to the Piedmont Carolinas

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested

☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II **Please indicate which topics you would be willing to address:**

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Engineering and Management)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: Samples of how skills are used on the job.

DATA SHEET

PACE Speaker's Guide

SECTION I Name John Blaich Office Phone 803-882-9841

Title Asst. Manager - Human Resources Company or Agency Engelhard Corporation

Company Address P. O. Box 1739, Seneca, SC 29678

Brief description of what your company/agency does: Chemical Catalyst Division

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested

☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name Roger D. Powell Office Phone (803) 855-2884

Title Manager, Human Resources Company or Agency Fluid Controls

Company Address 1201 Pelzer Hwy., Easley, S.C. 29640

Brief description of what your company/agency does: Highly automated manufacturer of hydraulic control valves and pumps.

Preference for speaking times: ☐ mornings ☐ afternoons ☑ mornings or afternoons depending on date requested
☑ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: ______________________________)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☒ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☒ Other topics. (Please indicate topic area(s): How to prepare for job interviews. ______________________________)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: ______________________________

DATA SHEET

PACE Speaker's Guide

SECTION I Name H. Joe Blackwell Office Phone 224-1671 ext 1

Title Assoc. Industrial Engineer Company or Agency Glen Raven Mills, Inc.

Company Address Equinox Plant, P.O. Box 1926, Anderson, SC 29622

Brief description of what your company/agency does: Producer of quality fabrics for awnings, outdoor furniture, marine trade and automotives.

Preference for speaking times: ☐ mornings ☐ afternoons ☑ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☐ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☑ Importance of technical (job-related) skills to career success.

☑ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☑ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☑ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☑ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☑ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☑ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET
PACE Speaker's Guide

SECTION I Name Richard Hall Office Phone 803-224-1671 Ext.132

Title Industrial Engineer Company or Agency Glen Raven Mills, Inc.

Company Address Equinox Plant.P.O. Box 1926. Anderson. S.C. 29622

Brief description of what your company/agency does: Producer of quality fabrics for awnings, outdoor furniture, marine trade and automotives.

Preference for speaking times: ☐ mornings ☐ afternoons ☑ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☑ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☑ Importance of technical (job-related) skills to career success.

☑ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☑ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☑ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☑ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☑ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☑ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name R. Kevin Pruett Office Phone 224-1671 EXT 150

Title Assistant Personnel Director Company or Agency Glen Raven Mills- Equinox Plant

Company Address P.O. Box 1926 Anderson SC 29622 (200 Jackson Street Anderson)

Brief description of what your company/agency does: Manufactures acrylic fabric for awnings, marine industry, automotive industry.

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested

☐ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET
PACE Speaker's Guide

SECTION I Name Jerry Hyche Office Phone (803) 843-9292

Title Plant Manager Company or Agency Greenwood Mills

Company Address P.O. Box 118, Liberty, SC 29657

Brief description of what your company/agency does: Manufactures denim

Preference for speaking times: ☒ mornings ☒ afternoons ☒ mornings or afternoons depending on date requested
☑ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II **Please indicate which topics you would be willing to address:**

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Any)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name Steve Campbell Office Phone (803)646-3263

Title Human Resources Manager Company or Agency Milliken (Gerrish Plant)

Company Address Rt 2 Dalton Dr Pendleton S.C. 29670

Brief description of what your company/agency does: Weaving location

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II **Please indicate which topics you would be willing to address:**

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name JERRY PENDLEY Office Phone (803) 369-0527

Title HUMAN RESOURCES MANAGER Company or Agency MILLIKEN & COMPANY

Company Address ROUTE 1 BOX 67 A, HONEA PATH, SC 29654

Brief description of what your company/agency does: TEXTILE MANUFACTURING

Preference for speaking times: ☐ mornings ☐ afternoons ☑ mornings or afternoons depending on date requested

☑ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☑ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☑ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☑ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☑ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☑ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☑ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☑ Discussing attributes that your company looks for in potential employees.

☑ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☑ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET
PACE Speaker's Guide

SECTION I Name Mike Powell Office Phone 338-7711

Title Human Resources Manager Company or Agency Milliken & Company

Company Address Peerless Plant, Route 5, Box 28, Belton, SC 29627

Brief description of what your company/agency does: Textile Manufacturing

Preference for speaking times: ☒ mornings ☐ afternoons ☐ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II **Please indicate which topics you would be willing to address:**

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

*I would prefer to participate primarily in Anderson County if possible.

DATA SHEET

PACE Speaker's Guide

SECTION I Name Jim Rutledge Office Phone 653-2235

Title Human Resource Manager Company or Agency Milliken & Company

Company Address P.O. Box 1032, Clemson, SC 29631

Brief description of what your company/agency does: Textile manufacturing

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II **Please indicate which topics you would be willing to address:**

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Technical manufacturing management)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET
PACE Speaker's Guide

SECTION I Name Mrs. Kay Shreve Office Phone 404-376-4743

Title Training Manager Company or Agency Monroe Auto Equipment Company

Company Address 200 McIntyre Drive, Hartwell, GA 30643

Brief description of what your company/agency does: manufacture automotive equipment, shocks, and struts

Preference for speaking times: ☐ mornings ☒ afternoons ☒ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☒ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Statistics, Quality Assurance, Industrial Management)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level. Use of math in advanced industrial technologies - even if you only want a "faculty job."

☒ Importance of technical (job-related) skills to career success.

☒ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end." - I dropped out myself - waited 10 years for a GED, then went to college at night while working full time and raising a family.

☒ Other topics. (Please indicate topic area(s): Technical advances in manufacturing that have changed introductory needs of employers.)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: demonstrations of math skills required.

DATA SHEET

PACE Speaker's Guide

SECTION I Name Reggie Buckley Office Phone 296-4207

Title Manufacturing Engineer Company or Agency Owens/Corning Fiberglas

Company Address P. O. Box 1367, Anderson, SC 29622

Brief description of what your company/agency does: Manufacturer of glass fibers.

Preference for speaking times: ☐ mornings ☒ afternoons ☐ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☐ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☒ Other topics. (Please indicate topic area(s): Career selection in light of an individual's own interest.)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name Steve Cunanan Office Phone 296-4268

Title Employment specialist Company or Agency Owens-Corning Fiberglas

Company Address P.O. Box 1367, Anderson, SC 29622

Brief description of what your company/agency does: Manuafacture fiberglas reinforcements and resin products

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: ______)

☐ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☒ Other topics. (Please indicate topic area(s): Employee literacy requirements in the 21st century, interviewing skills)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: ______

DATA SHEET
PACE Speaker's Guide

SECTION I Name Lucious Glenn Office Phone 296-4196

Title Dept. Supervisor Company or Agency Owens/Corning Fiberglas Corp.

Company Address P. O. Box 1367, Anderson, SC 29622

Brief description of what your company/agency does: Manufacturer of glass fibers.

Preference for speaking times: ☐ mornings ☒ afternoons ☐ mornings or afternoons depending on date requested

☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Engineering, Management)

☐ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET
PACE Speaker's Guide

SECTION I Name Thomas C. Herbster Office Phone 296-4048

Title Industrial Relations Specialist Company or Agency Owens/Corning Fiberglas

Company Address P. O. Box 1367, Anderson, SC 29622

Brief description of what your company/agency does: Manufacturer of glass fibers.

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Human Resources, Manufacturing)

☐ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☒ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name Beth Posey-Leonhard Office Phone 296-4167

Title Batch House Supervisor Company or Agency Owens/Corning Fiberglas

Company Address P. O. Box 1367, Anderson, SC 29622

Brief description of what your company/agency does: Manufacturer of glass fibers.

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II **Please indicate which topics you would be willing to address:**

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Engineering, Supervision, Production Management)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s): Women in typical "male" jobs.)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET
PACE Speaker's Guide

SECTION I Name Gregory L. Morgan Office Phone 296-4232

Title Technical Dept. Supervisor Company or Agency Owens/Corning Fiberglas

Company Address P. O. Box 1367, Anderson, SC 29622

Brief description of what your company/agency does: Manufacturer of glass fibers.

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☒ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Shift Supervisor, Manufacturing Engineer)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☒ Other topics. (Please indicate topic area(s): discuss the making of fiberglas-share personal experiences, I have an Associate degree in glass plastics technology.)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name James N. Roser Office Phone 296-4053

Title Manager, Human Resources Company or Agency Owens/Corning Fiberglas

Company Address P. O. Box 1367, Anderson, SC 29622

Brief description of what your company/agency does: Manufacturer of glass fibers.

Preference for speaking times: ☐ mornings ☐ afternoons ☐ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: ____________________)

☐ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s): ____________________)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: ____________________

DATA SHEET

PACE Speaker's Guide

SECTION I Name John C. Wells Office Phone 296-4003

Title Superintendent Company or Agency Owens/Corning Fiberglas

Company Address P. O. Box 1367, Anderson, SC 29622

Brief description of what your company/agency does: Manufacturer of glass fibers.

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested

☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name Ray Wierzbowski Office Phone (803) 296-4023

Title Manufacturing Engineer Company or Agency Owens Corning Fiberglas

Company Address P.O. Box 1367, Anderson, SC 29622

Brief description of what your company/agency does: Produces Fiberglas

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☐ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☒ Other topics. (Please indicate topic area(s): The Measurement of Success)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name Archie I. Barron Office Phone 882-5660

Title Administrative Manager Company or Agency Phillips Fibers Corporation

Company Address P.O. Box P66, Seneca, SC 29679

Brief description of what your company/agency does: Non woven fabric manufacturer

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: ________________)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s): ________________)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: ________________

DATA SHEET

PACE Speaker's Guide

SECTION I Name Dennis Fraley Office Phone 647-9524

Title Vice President Company or Agency Steel Heddle Manufacturing, Co.

Company Address P.O. Box 619, Westminster, SC 29693

Brief description of what your company/agency does: Flat wire producer; all metal types

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested

☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II **Please indicate which topics you would be willing to address:**

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Business management; Industrial engineering)

☐ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name Michael J. Conners Office Phone (803) 369-7395

Title Manufacturing Superintendent Company or Agency Torrington Company

Company Address Brick Mill Road, Honea Path, SC 29654

Brief description of what your company/agency does: Maufactuirng a variety of steering and transmission components for the automotive industry.

Preference for speaking times: ☒ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II **Please indicate which topics you would be willing to address:**

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☒ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: How we use English & Math skills via demonstrations.

DATA SHEET

PACE Speaker's Guide

SECTION I Name James E. McCoy Office Phone 803-638-3683

Title Plant Manager Company or Agency The Torrington Company

Company Address P.O. Box 100, Walhalla, SC 29691

Brief description of what your company/agency does: Manufactures Bearings

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☒ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☒ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: As available

DATA SHEET
PACE Speaker's Guide

SECTION I Name Jim M. Smith Office Phone 638-3683

Title Personnel Manager Company or Agency The Torrington Company

Company Address P.O. Box 100, Walhalla, SC 29691

Brief description of what your company/agency does: Manufactures Bearings

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☒ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: As available

DATA SHEET
PACE Speaker's Guide

SECTION I Name Johnny R. Smith Office Phone 369-7395

Title Quality Assurance Manager Company or Agency The Torrington Company

Company Address P.O. Box 565, Brick Mill Road, Honea Path, SC 29654

Brief description of what your company/agency does: Precision metal pins, shifts, & assemblies supplied to automotive, aviation, and general industrial customers.

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II **Please indicate which topics you would be willing to address:**

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: ______________________________)

☐ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☒ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s): ______________________________)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: ______________________________

DATA SHEET
PACE Speaker's Guide

SECTION I Name Mark E. Yost Office Phone (803) 638-3683

Title Manufacturing Superintendent Company or Agency The Torrington Company

Company Address P.O. Box 100, Walhalla, SC 29691

Brief description of what your company/agency does: Manufactures Thrust Bearings

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☐ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☒ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: As Available

DATA SHEET
PACE Speaker's Guide

SECTION I Name Brian F. Mahoney Office Phone 803-647-2061

Title Administrative Manager Company or Agency U.S. Engine Valve Corporation

Company Address P.O. Box 277

Brief description of what your company/agency does: Manufacturing of Engine Valves

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II **Please indicate which topics you would be willing to address:**

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s): Attitude toward big business)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name Mrs. Jody G. Gaulin Office Phone 653-2775

Title Personnel Manager Company or Agency Westpoint Pepperell
Clemson Fabricating Plant

Company Address Clemson, SC 29633-1800

Brief description of what your company/agency does: Manufacture sheets and pillow cases in this division

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☒ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☒ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: Pencils to distribute, photos of plant operations - illustrate "high tech" nature of jobs

DATA SHEET

PACE Speaker's Guide

SECTION I Name Bill Musick Office Phone 882-2414

Title Supervisor-Human Resources Company or Agency Square D Company

Company Address 1998 Sandifer Blvd.

Brief description of what your company/agency does: Fabricates and assembles Motor Control Devices

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested

☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☒ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name Sheila K. Brown Office Phone 261-1263

Title Director of Volunteer Services Company or Agency Anderson Memorial Hospital

Company Address 800 N. Fant St. Anderson. S.C. 29621

Brief description of what your company/agency does: The Department of Volunteer Services receives, trains and coordinates volunteer services. Also manages an emergency response system for the elderly and disabled.

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Management of Department in Local Hospital)

☐ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: key chains, mirrors, pencils

Thank you for your willingness to share your expertise with area students! **PLEASE RETURN THIS FORM IN THE ENVELOPE PROVIDED BY *Friday, December 15, 1989* TO:**

Mr. Rick F. Murphy, Counselor Liaison, Partnership for Academic and Career Education,
Tri-County Technical College, P. O. Box 587, Pendleton, SC 29670.

DATA SHEET

PACE Speaker's Guide

SECTION I Name Dr. Micheal Bucci Office Phone 261-1000

Title Head of Neuro-Surgery Department Company or Agency Anderson Memorial Hospital

Company Address 800 N. Fant Street, Anderson, SC 29621

Brief description of what your company/agency does:

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☒ Other topics. (Please indicate topic area(s): How drug abuse and other addictions effect the brain)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET
PACE Speaker's Guide

SECTION I Name Rick Kaylor Office Phone 261-[illegible]09

Title Vice President Company or Agency Anderson Memorial Hospital

Company Address 800 North Fant Street, Anderson SC 29624

Brief description of what your company/agency does: Hospital; Health Care System

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: ______)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s): ______)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: ______

DATA SHEET
PACE Speaker's Guide

SECTION I Name Virginia Suggs Office Phone 261-1162

Title Employment Manager Company or Agency Anderson Memorial Hospital

Company Address 800 N. Fant Street, Anderson, SC 29621

Brief description of what your company/agency does: Health Care Provider

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested

☒ prefer to speak for one or two class periods ☒ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Medical Lab Technology; Allied Health including Nursing, Respiratory & Physical Therapy, Radiology; plus other medical careers/jobs in our hospital)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name Al Watson Office Phone 261-1819

Title Program Director - Psychiatry Company or Agency Anderson Memorial Hospital

Company Address 800 North Fant Street, Anderson, SC 29624

Brief description of what your company/agency does: Provides psychiatric care for adults

Preference for speaking times: ☐ mornings ☒ afternoons ☐ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☒ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Nursing - Activity Therapy)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name Vickie Currin Office Phone 855-7792

Title Director of Education Company or Agency Baptist Medical Center of Easley

Company Address P.O. Box 687, Easley, SC 29641-0687

Brief description of what your company/agency does: 109 - bed acute care hospital

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II **Please indicate which topics you would be willing to address:**

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Nursing)

☐ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☒ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name Elizabeth Cox, RN Office Phone 878-4791

Title Director of Nursing Company or Agency Cannon Memorial Hospital

Company Address P.O. Box 188, Pickens, SC 29671

Brief description of what your company/agency does: Health Care - Patient and Public Education in Health Related Areas

Preference for speaking times: ☐ mornings ☐ afternoons ☐ mornings or afternoons depending on date requested

☐ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II **Please indicate which topics you would be willing to address:**

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Nursing - RN, LPN, Nursing attendents)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☒ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET
PACE Speaker's Guide

SECTION I Name James A. Uzzell Office Phone 803-878-4791

Title Administrator Company or Agency Cannon Memorial Hospital

Company Address P.O. Box 188, 842 Pendleton Street, Pickens, SC 29671

Brief description of what your company/agency does: Hospital-Acute care

Preference for speaking times: ☒ mornings ☐ afternoons ☐ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II **Please indicate which topics you would be willing to address:**

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Lab technology, X-ray, R.T., Pharmacy, etc.)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☒ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name Tracy Williamson Office Phone (803) 882-3351

Title Marketing Director Company or Agency Oconee Memorial Hospital

Company Address P.O. Box 858, Seneca, SC 29679

Brief description of what your company/agency does: Healthcare, wellness, Geriatrics (at the Lila Doyle Nursing Care Facility).

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Variety of careers; professional, tech, secretarial, etc.)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☒ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: all, depending on topic

DATA SHEET
PACE Speaker's Guide

SECTION I Name Roddey E. Gettys III Office Phone 855-7603

Title Executive Vice President Company or Agency Baptist Medical Center Easley

Company Address P.O. Box 687 Easley, SC 29641

Brief description of what your company/agency does: Hospital

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested

☑ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II **Please indicate which topics you would be willing to address:**

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☐ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☑ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☑ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: possibly do some "freebies"

DATA SHEET

PACE Speaker's Guide

SECTION I Name Charlene Spelts Office Phone 224-8127

Title Insurance Sales Company or Agency Anderson Insurance Center

Company Address 1205-A Ella Street, P.O. Box 836, Anderson, SC 29622

Brief description of what your company/agency does: Insurance Needs

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested

☐ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: ____)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s): ____)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: ____

DATA SHEET

PACE Speaker's Guide

D

SECTION I Name Carlene Shuler Brown Office Phone 225-3922

Title Owner/Artist Company or Agency Carlene Shuler Brown Studio & Gallery

Company Address 2406 N. Main Street, Anderson, SC 29621

Brief description of what your company/agency does: Art gallery - Art Classes

Preference for speaking times: ☒ mornings ☐ afternoons ☐ mornings or afternoons depending on date requested

☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II **Please indicate which topics you would be willing to address:**

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☒ Other topics. (Please indicate topic area(s): importance of attitude (determination, positive thinking)
How to be a winner and get what you want in life;
How I went from being a housewife and mother to owning my own business and what I had to learn along the way.)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name Randy Bell Office Phone 654-5574

Title Vice President Company or Agency First Federal of S.C.

Company Address 207 College Avenue, Clemson, SC 29631

Brief description of what your company/agency does: banking, mortgage lending

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested

☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☐ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name Lauren Murphy Office Phone 878-3525

Title Assistant Vice President Company or Agency First National of Pickens Co.

Company Address 144 East Main Street, Pickens, SC

Brief description of what your company/agency does: Banking

Preference for speaking times: ☒ mornings ☒ afternoons ☐ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET
PACE Speaker's Guide

SECTION I Name Tom Clay Office Phone 225-2511

Title Human Resource & Operations Manager Company or Agency Gallant-Belk

Company Address Anderson Mall

Brief description of what your company/agency does: Department Store

I will discuss any requests on a case by case bases

Preference for speaking times: ☐ mornings ☐ afternoons ☐ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☐ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name Jack W. Barnes Office Phone 225-4641

Title Store Manager Company or Agency J. C. Penney Company

Company Address 3187 North Main Street, Anderson, SC 29621

Brief description of what your company/agency does: Retail Department Store

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested

☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II **Please indicate which topics you would be willing to address:**

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☒ Other topics. (Please indicate topic area(s): Working part-time while in school)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: training tapes, give away pen/highlighters

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DATA SHEET

PACE Speaker's Guide

SECTION I Name Coleman C. Jennings Office Phone 885-3294

Title Station Emergency Planner Company or Agency Duke Power - ONS

Company Address P.O. Box 1439, Seneca, SC 29679

Brief description of what your company/agency does: Electric Utility

Preference for speaking times: ☒ mornings ☐ afternoons ☐ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name Fred Linsley Office Phone 885-3132

Title Engineer Company or Agency Duke Power

Company Address Oconee Nuclear Station, P.O. Box 1439, Seneca, SC 29679

Brief description of what your company/agency does: Operates and Maintains Oconee Nuclear Station

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II **Please indicate which topics you would be willing to address:**

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Maintenance technician, Construction worker)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☒ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☒ Other topics. (Please indicate topic area(s): Due to the increase in minimum wage and advanced technology, unskilled labor jobs are disappearing. This type of work is being done more and more by machines and robotics.)

Check any of the following that you would also be willing to do:

☐ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name Bill McAlister Office Phone 885-3100

Title Engineering Supervisor I Company or Agency Duke Power, ONS

Company Address Oconee Nuclear Station, P.O. Box 1439, Seneca, SC 29679

Brief description of what your company/agency does: Electric Utility - Nuclear Power Generation

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II **Please indicate which topics you would be willing to address:**

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Electrical Engineering/Engineering Management)

☐ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET

PACE Speaker's Guide

SECTION I Name James (Jim) A. Long Office Phone 885-3201

Title General Supervisor Radiation Protection Company or Agency Duke Power Company/Oconee

Company Address P.O. Box 1439, Seneca, SC 29679

Brief description of what your company/agency does: Electrical Power production/electrical power transmission/electrical power distribution with related services.

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II **Please indicate which topics you would be willing to address:**

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: ______)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☒ Other topics. (Please indicate topic area(s): Military service, Navy, Submarine service, nuclear power)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: ______

DATA SHEET
PACE Speaker's Guide

SECTION I Name John R. Perkins, Jr. Office Phone 885-3354

Title Assistant Maintenance Engineer Company or Agency Duke Power Company

Company Address Oconee Nuclear Station, Seneca, SC 29679

Brief description of what your company/agency does: Oconee Nuclear Station generates approximately 25% of Duke Power's entire electrical output.

Preference for speaking times: ☐ mornings ☒ afternoons ☐ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II **Please indicate which topics you would be willing to address:**

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☒ Other topics. (Please indicate topic area(s): Why it is never "too late" to get serious about schoolwork; high school or post-grad.)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☒ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: Possibly videotapes, demos to show what Duke Power does. Get them to come to World of Energy Center at Oconee.

DATA SHEET
PACE Speaker's Guide

SECTION I Name George C. O'Neal Office Phone 885-3334

Title Nuclear Production Engineer Company or Agency Duke Power Company

Company Address Oconee Nuclear Station, Seneca, SC 29679

Brief description of what your company/agency does: Public Utility

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II **Please indicate which topics you would be willing to address:**

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: ____________________)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☒ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s): ____________________)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations: ____________________

DATA SHEET
PACE Speaker's Guide

SECTION I Name Jimmy J. Sevic Office Phone 885-3222

Title Chemistry Manager Company or Agency Duke Power Co., ONS

Company Address P.O. Box 1439, Seneca, SC 29679

Brief description of what your company/agency does: Production and distribution of electrical power

Preference for speaking times: ☐ mornings ☐ afternoons ☐ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II **Please indicate which topics you would be willing to address:**

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: environmental, chemistry, management/supervisory)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☒ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☒ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☒ Other topics. (Please indicate topic area(s): Environmental Studies and Environmental Features of Duke Power Lakes, Biology of Lakes, Radiological Environmental Monitoring and Wildflowers of mountains and Piedmont of Carolinas.)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET
PACE Speaker's Guide

SECTION I Name Ken Rohde Office Phone 885-3282

Title Nuclear Production Engineer Company or Agency Duke Power

Company Address Oconee Nuclear Station, P.O. Box 1439, Seneca, SC 29679

Brief description of what your company/agency does: Electric Utility

Preference for speaking times: ☐ mornings ☐ afternoons ☐ mornings or afternoons depending on date requested
☐ prefer to speak for one or two class periods ☒ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas: Electronic Engineering)

☒ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☒ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

Prefer Pickens County - Live in Liberty

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DATA SHEET
PACE Speaker's Guide

SECTION I Name World of Energy Office Phone 885-4600

Title

Company or Agency Duke Power Company

Company Address P.O. Box 1687, Clemson, SC 29633

Brief description of what your company/agency does: Provide Information to the public on all aspects of Duke Power's Operation's

Preference for speaking times: ☒ mornings ☒ afternoons ☒ mornings or afternoons depending on date requested

☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☐ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☐ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☐ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☐ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☐ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☒ Other topics. (Please indicate topic area(s): Basic Electricity; Electric Safety; Generation & Transmission Nuclear Power; Protecting the Environment (for Oconee & Pickens Counties only))

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

DATA SHEET
PACE Speaker's Guide

SECTION I Name Buddy R. White Office Phone 885-2810

Title Equipment Data Base Rep. Company or Agency Duke Power

Company Address Seneca, SC 29679

Brief description of what your company/agency does: Produces electricity

Preference for speaking times: ☐ mornings ☐ afternoons ☒ mornings or afternoons depending on date requested
☒ prefer to speak for one or two class periods ☐ willing to address six class periods (8 a.m. - 3 p.m.), depending on date

SECTION II Please indicate which topics you would be willing to address:

☒ Information on what's involved in one or more specific mid-level, or other career areas. (Please indicate which career areas:)

☐ Importance of academic skills (math, communications) to career success and importance of doing well in these classes on the high school and/or college level.

☒ Importance of technical (job-related) skills to career success.

☐ Importance of taking vocational/occupational courses in high school.

☒ Encouraging students to pursue college training after high school and/or benefits of earning a two-year college degree (advantages in being hired and/or qualifying for promotions).

☐ Ways your company encourages people to obtain an education. (Co-op opportunities, reimbursing tuition costs, etc.)

☐ Importance of problem-solving, teamwork, interpersonal communications skills, and/or work ethic to your company and/or to being successful in the world of work.

☐ Discussing areas you believe will be important to local businesses in the future relating to educated/skilled employees.

☐ Discussing attributes that your company looks for in potential employees.

☒ Discussing the lack of opportunities for people who don't have a high school diploma, helping students see that dropping out is a "dead end."

☐ Other topics. (Please indicate topic area(s):)

Check any of the following that you would also be willing to do:

☒ Discuss the possibility of addressing other topics of interest to teachers and/or counselors.

☐ Bring handouts, samples of how your employees use English or math skills on the job, videotapes or demonstrations to help students understand one or more careers, and/or bring "freebies" (i.e., key chains, pocket calendars, other small items from your company) to give to students. Which of these items listed, or others you might think of, would you be willing to bring for class presentations:

PARTNERSHIP FOR ACADEMIC AND CAREER EDUCATION
SPEAKERS GUIDE EVALUATION FORM
FOR
TEACHERS/COUNSELORS

The PACE staff is interested in your opinions and suggestions for improvement concerning the Guide to Area Business Speakers. Please complete the survey below and mail to:

Mr. Rick F. Murphy
Counselor Liaison
Partnership for Academic and Career Education
P.O. Box 587
Pendleton, SC 29670

1. Please indicate whether you are a teacher, counselor, administrator, etc. and whether your school is a middle, junior high, or high school: (If you are a teacher, please also tell us what subject(s) you teach.)

2. How have you used the Guide? (Check all that apply.)

   ___ to identify speakers for classroom presentations
   ___ to identify speakers for presentations to student clubs
   ___ to identify speakers for career days
   ___ to identify speakers for staff inservice
   ___ other: ___

3. How helpful did you find the section on "Suggestions for Teachers and Counselors in Using Guest Speakers"?

   ___ very helpful
   ___ somewhat helpful
   ___ not very helpful

4. How many speakers have you contacted, using this Guide, who have made visits to your school?

   ___ 10 or more
   ___ 7-9
   ___ 4-6
   ___ 1-3
   ___ none

(over)

5. Please tell us what you feel the impact has been of having business professionals speak to student groups, and/or other groups, at your school:

____

____

____

____

(If more space is needed, please continue on an attachment.)

6. Please describe any problems you encountered in using the Guide or in having speakers who where identified through the Guide visit your class/school. (If there were no problems, please indicate "none.")

____

____

____

____

(If more space is needed, please continue on an attachment.)

7. How could the Guide be improved?

____

____

____

____

(If more space is needed, please continue on an attachment.)

______________________________ **(optional)**

NAME

THANK YOU FOR TAKING THE TIME TO COMPLETE THIS EVALUATION!

PARTNERSHIP FOR ACADEMIC AND CAREER EDUCATION
SPEAKERS GUIDE EVALUATION FORM
FOR
SPEAKERS

The PACE staff is interested in your opinions concerning the Speakers Guide project and any suggestions you might have for improvements. Please complete the survey below and mail to:

Mr. Rick F. Murphy
Counselor Liaison
Partnership for Academic and Career Education
P.O. Box 587
Pendleton, SC 29670

NAME: ______________________________
(Please print)

COMPANY: ______________________________

1. Approximately how many times have you been contacted to address student groups (or other groups) as a result of being listed in the Guide?

___ 10 or more
___ 7-9
___ 4-6
___ 2-3
___ once
___ have not been contacted to date

2. Please list the topics, or general topic areas, that you've been asked to address most frequently:

____

____

____

3. How helpful did you find the section in the Guide entitled, "Suggestions for Speakers"?

___ very helpful
___ somewhat helpful
___ not very helpful

(over)

4. What have been some of the positive aspects for you in speaking to classes or student groups?

(If more space is needed, please continue on an attachment.)

5. Please describe any problems you've encountered related to your participation in the Speakers Guide project. (If there were no problems, please indicate "none.")

(If more space is needed, please continue on an attachment.)

6. How could the Guide or the project be improved?

(If more space is needed, please continue on an attachment.)

7. Please provide any other comments you have concerning your participation in the Speakers Guide project:

(If more space is needed, please continue on an attachment.)

THANK YOU FOR TAKING THE TIME TO COMPLETE THIS EVALUATION!

PACE

P. O. Box 587 • Pendleton, SC • 29670
(803) 646-8361 Ext. 2107

A career in the technologies is as easy as 1-2-3!

- ☑ **Identify your interests and options**
- ☑ **Get the facts**
- ☑ **Start preparing now!**

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Think about your interests and options!

Follow these three easy steps to finding a technology career that's right for you...

Identify your abilities, likes and dislikes:

- Take a career interest test. Your counselor may have some suggestions, or contact your area technical college, or look for the book, The Fifty-Minute Career Discovery Program by E.N. Chapman (1988).
- Take half an hour of uninterrupted time and write down all the characteristics that interest you about a job or career (like working with people, tasks that involve math, working with computers, etc.).
- Talk with someone you trust about your likes and dislikes and about career areas that might be best suited to you.

> "Working in electronics is a real challenge! I have a lot of variety in what I do and there's plenty of room for advancement. It took me a while to find a career that was right for me, but I'm really happy with my decision to go into electronics technology."
>
> --*Carol R. Findley*
> *Instructional Support Technician*
> *Applied Microelectronics Center*
> *Tri-County Technical College*

Investigate different careers! Look for opportunities like:

- shadow or mentoring programs at school;
- field trips, guest speakers, or career fairs where you can ask questions of people in different jobs ;
- computer-based career information systems like SCOIS, available in many area schools, or look for career books in your library or guidance office.
- Visit your area career center and different departments at area two-year colleges, talk with teachers and students about the courses, labs, and the types of jobs and salaries available to graduates.
- Talk with neighbors, relatives, or friends who hold jobs that interest you—ask them what their jobs involve and what they like most about what they do.
- Determine the kind of education you'll need to enter the career areas that you've identified.

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Experiment!

- Take high school vocational or occupational courses in areas that interest you.
- Volunteer in hospitals or other service agencies to gain first-hand knowledge about health care, public service, or similar career areas.
- Get involved in something—join a club, school newspaper staff, community organization, etc. to give you more exposure to different career-related activities.

Get the facts—

Watch out for the six most-common career preparation myths:

Myth #1
"There are plenty of good jobs for people who finish high school."

Fact:
By the year 2000, the average job in the Southeast will require almost 2 years of education beyond high school.

Myth #2
"To qualify for a really good job, I need a four-year college degree."

Fact:
You can earn high salaries ($25,000 and higher in some cases!) with a two-year college degree in challenging positions with a variety of responsibilities.

Myth #3
"Technology jobs aren't for everyone, females have trouble finding jobs."

Fact:
There's a place in the technologies for everyone! In fact, projections are that females and minorities will have better opportunities than ever in technology fields—all that's needed is the right training and a will to succeed!

Myth #4
"If all I need is a two-year, technical college degree, then I can relax because it doesn't matter what I take in high school."

Fact:
Preparing for a career starts in high school. Taking the right academic courses, and combining them with vocational courses can save you time, money, and frustration in college and may qualify you for advanced placement!

Myth #5
"I don't know anything about electronics or other technical subjects, and I'm terrible in math. I'd never make it in a technology career."

Fact:
Technology careers are not only in technical fields, they can be in health, business, or public service areas too. While it's true that having some vocational background is helpful, two-year college programs start with basic courses and build up—so you don't have to know all the answers when you begin! And as for math, if you haven't taken the right high school courses, or need to brush-up, you can enroll in a technical college and gain the skills you need to be successful in any major!

Myth #6
"I know two-year colleges aren't as expensive as universities, but there's no way I can afford it."

Fact:
There are many opportunities to finance a two-year college education. In addition to grants and scholarships, several area companies now sponsor programs where you work part-time and receive funds for tuition and books! Where there's a will, there's a way, so find out what's available—talk with your counselor or the financial aid office at the two-year college you plan to attend!

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What's so great about mid-level technology careers?

- They offer good salaries, interesting work, and opportunities for advancement, all with less than a four-year college degree!
- They represent a large portion of the job growth in South Carolina and throughout the country.
- They involve many different areas such as industrial and engineering technology, business, allied health, and public service fields; **and...**

You can start preparing for a technology career in high school. In fact, your high school studies may qualify you to earn college credit and provide you with opportunities to receive tuition assistance that may pay all of your college costs!

"This is a great program! I enjoy what I'm learning in class and our lab projects are really interesting. Thanks to a special scholarship program with the ROBERT BOSCH corporation, all my college expenses are taken care of, and I have a great part-time job that relates to what I'm learning in class.

--Robin Suggs
Student, Machine Tool Technology

"I'm convinced that a two-year college degree can lead to some great jobs and many possibilities for advancement. As an associate degree graduate myself, I know first-hand that this type of education can be a real plus in the job market!"

--Marcel Robinson
Personnel and Training Representative
Phillips Fibers Corporation

"After working for awhile in a nursing home, I realized that to get anywhere I'd need more education. I really enjoy my studies in nursing and I know I'll have some good job opportunities after graduation."

--Gary L. Stancil
Student, Practical Nursing

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Start preparing now for an exciting career in one of the technologies...

Starting early is important because your middle/junior high and high school studies are the foundation for success in any technology career. So, if your school has a Tech Prep (PREParation for TECHnologies) program, follow the course recommendations in your school's program guide. Otherwise, here are some general tips to help you plan:

- Take four units of mathematics and three units of science.
- Always take the highest level course you are capable of handling successfully .
- Take some vocational or occupational courses. Computer courses are particularly helpful for any college major, and with your vocational coursework, you may qualify for college credit through such programs as Technical Advanced Placement (TAP) available at Tri-County Technical College.
- Take a foreign language in high school and continue your studies in college. (Because many area companies are now international, skills in any foreign language can be a real advantage in the job market!)
- Apply yourself in all courses, learn to study and manage your time effectively, and do your very best in English classes. (The ability to communicate, especially in writing, will be one of your most valuable college, career, and life skills!)
- Talk with your high school counselor, vocational teacher, or area two-year college counselor about special options to finance a college education including "earn while you learn" opportunities such as co-op, technical scholars/apprentice programs, work-study, and others!

Start your course and career planning today!

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TECHNICIAN
MAINTENANCE ELECTRICIAN 2nd Shift
MECHANICAL DESIGN DRAFTSPERSON
LAB ANALYTICAL SPECIALIST
ACCOUNTING CLERK
WAFER FABRICATION PROCESS TECHNICIANS
EXPERIENCED DRAFTER
CNC PROGRAM
DEPUTY BUILDING OFFICIAL
A/V ELECTRONIC TECH
CHEMICAL ENGINEERING TECHNOLOGY
MECHANICAL ENGINEERING TECHNOLOGY
MICROELECTRONICS TECHNOLOGY
CERTIFIED SURGICAL TECHNICIAN
ADMINISTRATIVE ASSISTANT
QC LAB TECHNICIAN
MAINTENANCE MECHANIC
ALCOA FUJIKURA LTD.
CHEMICAL LAB TECHNICIAN
Technical Writer
EXTRUDER OPERATOR
LPN II
PROGRAMMER ANALYST
LABORATORY TECHNICIAN
ACCOUNTANT
ENGINEERING LABORATORY TECHNICIAN
TECHNICAL ILLUSTRATOR
ACCOUNTING
QUALITY CONTROL
Technician
ASSOCIATE DESIGNER
MANUFACTURING ENGINEER

This brochure was published by the Partnership for Academic and Career Education (PACE), a business-education organization promoting Tech Prep programs for students in Anderson, Oconee and Pickens counties of South Carolina. Funding for the brochure was made possible through a Carl Perkins grant awarded to PACE by the South Carolina Department of Education's Office of Vocational Education.

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(**PACE**, P.O. Box 587, Pendleton, SC 29670, 803-646-8361, ext. 2107)

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APPENDIX L

CAREER PLANNING FLOWCHART

LIBERTY HIGH SCHOOL

EXCELLENCE TODAY • PREPARED TOMORROW • EASLEY

D.W. DANIEL HIGH SCHOOL 1955

PRIDE PICKENS HIGH SCHOOL

WE HELP CHILDREN GROW • The School District Of Pickens County

DACUSVILLE JUNIOR HIGH SCHOOL

J.T. Simpson Academy

Pickens County Schools--
Preparing Students Today for Tomorrow's Careers

DOCTRINE CAPTA HODIE HOMINES OMIRE CRAS PARAT EJHS

EDWARDS JUNIOR HIGH • PANTHERS •

SPARKS
PICKENS JUNIOR HIGH

B.J. SKELTON
EASLEY DANIEL LIBERTY PICKENS
CAREER CENTER

LIBERTY MIDDLE SCHOOL •••EAGLES•••

Name: ______________________ School: ______________________

Guidance Counselor: ______________________ Grade: ______________________

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CAREER PLANNING FLOWCHART

Start Here

Step 1
List your job/career choice:
____

Step 2
Check (✓) all education and/or training required:

- ✓ 1. High school diploma
- ___ 2. Vocational training in high school
- ___ 3. Other career training: ______________
- ___ 4. Associate degree (two-year college)
- ___ 5. Bachelor's degree (four-year college)
- ___ 6. Professional degree (i.e., master's, doctorate)

Step 3
If your career choice requires more than vocational training, list area colleges or educational institutions that offer degree programs in your area of interest:

______________ ______________
______________ ______________

Step 4 PLAN YOUR HIGH-SCHOOL COURSES

a. List all courses you plan to take during grades 9-12 and any other supporting activities that will help you reach your career goal.
b. Check (✓) the courses which may qualify you for advanced placement at area two-year colleges or universities (AP, TAP, etc.) Enter your checkmarks on the left column beside the course title.
c. *Remember:* Planning the right academic and vocational courses in high school can save you time, money and frustration in preparing for a rewarding career!

FRESHMAN YEAR

	Course	Grade

Other activities: ______________
____

SOPHOMORE YEAR

	Course	Grade

Other activities ______________
____

JUNIOR YEAR

	Course	Grade

Other activities: ______________
____

SENIOR YEAR

	Course	Grade

Other activities: ______________
____

Step 5
CHECKLIST FOR SENIORS HEADED FOR FOUR-YEAR COLLEGES:

- ___ apply for admission and have transcripts and test scores mailed
- ___ visit campuses
- ___ apply for financial aid

CHECKLIST FOR SENIORS HEADED FOR TWO-YEAR COLLEGES:

- ___ plan to take co-op through the Career Center
- ___ apply for admission
- ___ apply for financial aid
- ___ apply for advanced placement
- ___ apply for college co-op and/or special tuition assistance programs

CHECKLIST FOR SENIORS HEADED FOR THE WORKPLACE:

- ___ meet with the job placement coordinator
- ___ brush up application and interviewing skills
- ___ check into company's policies for paying college tuition in case you want to continue your education later

Step 6
COMPLETE TRAINING AT:

____
(college choice)

Congratulations, you did it!
You're now ready to begin a rewarding, exciting career!

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PREPARING TODAY FOR TOMORROW'S CAREERS

Did you know...

...by the year 2000, the average job will require almost 14 years of formal education.

...jobs are becoming more technical requiring higher levels of mathematics, communications, computer and "teamworking" skills.

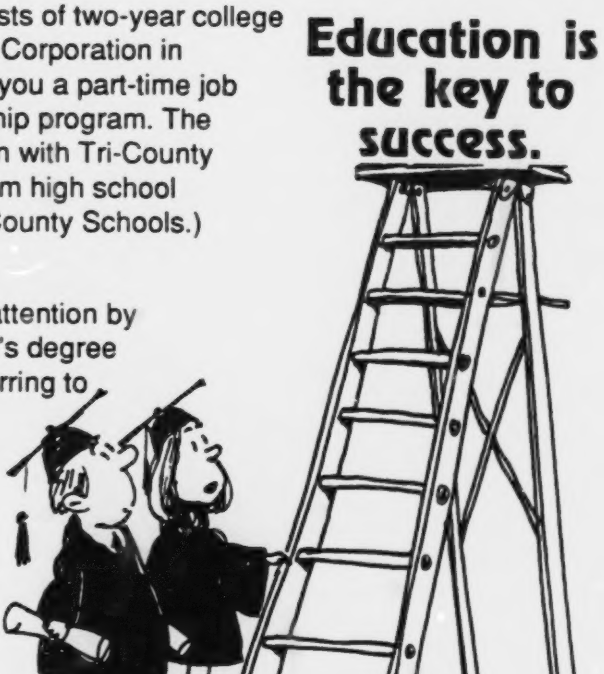
...vocational training in high school can provide you with job skills and qualify you for advanced placement in area technical colleges.

...opportunities are growing rapidly in mid-level technology careers that require one to two years of college study for entry and/or advancement.

...college graduates typically earn up to 68% more than what people without education beyond high school can earn.

...many area companies will now help pay the costs of two-year college degree programs. (And some, like the BOSCH Corporation in Anderson, will pay your college costs and give you a part-time job with benefits if you qualify for their apprenticeship program. The BOSCH apprenticeship program, in cooperation with Tri-County Technical College, encourages applications from high school seniors in all Anderson, Oconee and Pickens County Schools.)

...you can save money and have more personal attention by taking up to the first two years of your bachelor's degree program at a two-year college and then transferring to a university.


Education is the key to success.

(This Career Planning Flowchart was jointly developed by the School District of Pickens County and The Partnership for Academic and Career Education.)

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APPENDIX M

Technical
Advanced
Placement
(TAP)
Program

Handbook for Faculty and Staff

TRI-COUNTY
TECHNICAL
COLLEGE

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TECHNICAL ADVANCED PLACEMENT
HANDBOOK FOR FACULTY AND STAFF

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PURPOSE OF THIS BOOKLET

The information presented in this booklet is intended to assist faculty, department heads, division chairmen, counselors, and staff in managing the procedures associated with Technical Advanced Placement.

The booklet has been written to provide background information, to specify the responsibilities of different areas, and to give suggestions which, hopefully, will make the process more manageable and, ultimately, more effective for students.

In addition to reading the sections which directly apply to you (e.g., "Responsibilities of Advisors," if your role in TAP will primarily be as an academic advisor), it is suggested that everyone read the following sections:

- ⇨ introduction;
- ⇨ development of TAP procedures;
- ⇨ general information on TAP credit;
- ⇨ problems, concerns, ideas for improving TAP procedures.

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INTRODUCTION

Technical Advanced Placement (TAP) is the process through which advanced credit for TCTC courses is awarded to qualified high school students. TAP procedures are the result of articulation agreements between Anderson, Oconee, and Pickens County school districts and Tri-County Technical College (TCTC).

Benefits of TAP. Technical Advanced Placement has many benefits for schools, the College, and students:

Benefits for Schools

- encourages more students to enroll in vocational/occupational courses and to strive for excellence in their coursework;
- recognizes the importance of vocational/occupational course content at the secondary level;
- enables high school/career center and TCTC faculty to develop closer working relationships.

Benefits for TCTC

- encourages more students to enroll in TCTC programs who might not otherwise have chosen to do so;
- helps motivate students to persist in TCTC programs by not requiring them to repeat courses in which they have the necessary competencies;
- helps TCTC faculty develop closer working relationships and communication with high school/career center faculty.

Benefits for Students

- helps them feel that TCTC recognizes skills they've already developed;
- saves them time and/or money (or lightens course loads in entry-level terms at TCTC);
- reduces frustration of "repeating" course content that they have mastered in high school.

Technical Advanced Placement and Tech Prep. Technical Advanced Placement and articulation are processes belonging primarily to the curriculum departments and academic administration of Tri-County Technical College. TAP is associated with Tech Prep programs because Tech Prep seeks to eliminate "gaps" and "overlaps" between the secondary and postsecondary levels of education. Through articulation and TAP, "overlaps" are identified and qualified students are rewarded for their achievements by receiving College credit.

The PACE Role in Articulation and TAP. The role of the PACE staff is to assist TCTC faculty and division chairmen in the articulation process and in the development of TAP procedures. PACE staff also try to ensure that the interests of TCTC and the school districts are appropriately maintained and that the process works effectively for students. PACE staff assists both the College and the school districts by monitoring the effectiveness of procedures supporting the process--advising, publication of accurate information, adequate dissemination of information to the schools, evaluation of procedures, etc.

Tri-County Departments Affected by TAP. Technical Advanced Placement will eventually affect all TCTC departments as well as many administrative areas--whether departments award credit, or are the recipients of credit awarded through other departments, or whether they are involved in managing or tracking TAP credit.

At the present time, nine departments have articulated credit for 31 courses; one additional department (Industrial Mechanics) grants credit for a variety of courses depending on the vocational experience of individual students. Listed below are the TCTC departments and the courses for which they award credit.

ACC	ACC 101,102
EET	EET 115, 125, 131
EGT	EGT 111, 121
HVAC	ACR 105, 110, 136, 116, 137
IET	EEM 113, 123, 131
IM	(Curriculum courses in IMT or ACR depending on competencies in vocational program.)
MTT	MTT 112, 122, 132, 142
SSC/OST	SSC 152, 154, 159, 161, 162, 163, 143, 166
TMT	TEX 133
WLD	WLD 113, 102, EGT 102

Articulation committees are now working on agreements and procedures to award credit in computer technology, criminal justice, fashion merchandising, management/marketing, and child development.

In the near future, articulation committees will be formed to develop agreements and TAP procedures enabling credit to be awarded in mathematics and science (academic courses for occupational degree programs at Tri-County).

State Mandate for Articulation. Articulation was mandated by the State of South Carolina in 1986 (South Carolina Employment Revitalization Act; R429, H3701). As part of this legislation, each technical college was required to develop memoranda of agreement--documents which describe the procedures ensuring "a coordinated and articulated local delivery of vocational, technical, and adult basic and adult secondary education and job training." Copies of the Memoranda of Agreement between Tri-County Technical College and the school districts of Anderson, Oconee, and Pickens County schools, signed by the chairman of the College's area commission and the chairmen of the school boards of trustees, are available in the Executive Vice President's Office.

DEVELOPMENT OF TAP PROCEDURES

TAP procedures are developed as a result of articulation agreements in which committees of TCTC and public school/career center faculty have determined:

- which courses on the secondary and postsecondary level are equivalent by comparing course competencies;
- methods of validating students' competencies in the identified areas. (These methods are determined by the articulation committees and may, for example, involve a TAP exam*, high school teacher's recommendation, completion of a transition course or other methods.)

The appropriate division chairman is closely involved in the articulation process and is responsible for overseeing the results. Most articulation committees are chaired by the subject-area department head. Once the committee has completed a draft of their TAP procedures it is sent to the dean of instruction for review and approval. The division chairman also forwards copies of the draft to assistant superintendents of instruction, career center directors, and principals in each school district so they may review the suggested TAP procedures.

GENERAL INFORMATION ON TAP CREDIT

There are several factors associated with the awarding of TAP credit that apply to all areas:

1. The student does not have to be admitted to TCTC before applying for TAP credit.
2. A student may initiate the TAP process up to one year following his/her high school graduation date.
3. There are no fees required of the student to participate in TAP.
4. Once the student has completed all TAP procedures, he/she receives a "student exemption form" (see **APPENDIX A**).
5. Credit that has been awarded through TAP is good for one calendar year from the time the exemption slip is signed by the department head. (Once the student enrolls at TCTC, the credit becomes part of the permanent record.)
6. TAP credit appears on the student's official TCTC transcript at the end of the student's first active quarter (see **APPENDIX B**).

---

* A TAP exam is an exemption exam designed and administered by the department faculty.

GENERAL INFORMATION ON TAP CREDIT (continued)

7. TAP credit is awarded for specific TCTC courses--students may use the credit for required courses in degree, diploma, or certificate programs, for elective courses (with department head's approval) in degree programs, or as credit that has been substituted by the student's department head for a required course.

8. TAP credit is intended to be used by students who plan to graduate from TCTC occupational degree programs. (Students are advised that if they plan to transfer to another institution, they should NOT earn credit through TAP because other institutions may not honor this type of exemption credit.)

9. Students who've earned TAP credit for courses that comprise a Tech Ed certificate program will NOT be awarded a certificate without meeting the residency requirement (i.e., student must take 25% of the total credit hours through on-campus enrollment.)

   If a student has received TAP credit for all required courses listed in a certificate program, the department head could recommend some additional courses which would be substituted for one or more required courses. (The student would then meet the residency requirement by taking comparable on-campus courses without having to "re-take" courses for which he has already received exemption credit.

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RESPONSIBILITIES OF DIVISION CHAIRMEN

Division chairmen are closely involved in all aspects of articulation in their areas and the development of TAP procedures. The division chairmen have the following responsibilities:

1. Oversee the development, implementation, and evaluation of articulation agreements and TAP procedures in all appropriate departments within their divisions.

2. Assist department heads and articulation committees to have TAP agreements reviewed and approved by the dean of instruction and appropriate school district officials.

3. Provide the PACE office and others, as appropriate, with information on students who attempted to earn TAP credit but were not successful.

4. Apprise the dean of instruction and others, as appropriate, of factors associated with TAP that are not working satisfactorily and/or areas that need improvement.

RESPONSIBILITIES OF DEPARTMENT HEADS

Department heads play a key role in the success of the Technical Advanced Placement program. Some department heads are involved in developing and maintaining articulation agreements and awarding credit to qualified students. Other department heads may not have any of their own courses articulated but will need to work with students who've received credit from other departments.

Listed below are general responsibilities of department heads in the various areas of the articulation/TAP process.

All department heads.

1. Ensure that advisors ask incoming students whether or not they've received any exemption credit and for which course(s). Be sure to verify what the student says about earned credit by asking to see a copy of the exemption form or by calling Student Records. Remember that TAP only applies to recent high school graduates, "older" students may indicate that they've received exemption credit through evaluation of military experiences or other processes.

   (Remember that a student could have earned credit through another department that may apply to requirements in your program--CPT 170, SSC 154, ACC 101, etc.)

2. Remind advisors to check their "Advising Reports" for returning students. All exemption credit awarded will appear on the advising report. (If there are questions about whether or not a student has received TAP credit, call

Student Records.)

Department Heads who award credit through TAP.

1. Coordinate articulation committees, oversee development of effective TAP procedures.

2. Assist in the evaluation of TAP procedures (see section on evaluation, page 12).

3. Monitor progress of students who've applied for TAP (suggestion: keep a checklist of procedures and indicate dates that student completed each procedure--see example in **APPENDIX C.**)

4. Submit exemption forms to the Student Records Office for all students who've been awarded credit through the department (regardless of whether or not student has been admitted to TCTC) and keep a copy of the exemption form in the department records. (See example in **APPENDIX A.**)

5. Send a copy of the exemption form to the student along with an information sheet (see **APPENDIX D**) that includes the following reminders:

   - the credit will appear on his/her TCTC transcript at the end of the first active term;

   - only credit hours earned will show on the transcript (no grade) and that TAP credit will not affect GPA;

   - the course(s) for which credit has been awarded can be used in one of two ways: 1) as a required course if that course is listed in the College catalog for his/her degree program; or 2) as an elective in an associate degree program with permission of his/her department head;

   - the credit is good for one year from the date appearing on the exemption form; once he/she enrolls, the credit then becomes part of the permanent record;

   - the credit applies only to TCTC programs and that if the student plans to transfer to another college, he/she should not expect other institutions to accept TAP credit (other colleges have their own versions of TAP);

   - IT IS THE STUDENT'S RESPONSIBILITY TO TELL HIS/HER ACADEMIC ADVISOR OF CREDIT EARNED THROUGH TAP WHEN REGISTERING FOR THE FIRST TERM AT TCTC. **HE/SHE SHOULD BRING A COPY OF THE COURSE EXEMPTION FORM TO REGISTRATION.**

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Department Heads who award credit through TAP (continued)

6. Administer, score TAP exams (if required in the department's TAP procedures)--see section below on "Suggested procedures for administering TAP exams."

7. Keep accurate records on student's who've applied for TAP, taken exams, and received credit. (Try to get each student's full name and social security number!)

8. Submit lists to the division chairman of students who started but did not complete the process. (Students who have been awarded credit will be tracked through the computer or through Student Records' files.)

The following sections include suggestions for department heads who are involved in administering Technical Advanced Placement exams.

Suggested Procedures For Administering TAP Exams. If an articulation committee chooses to use a TAP exam as part of the TAP procedures, there are several things that the TCTC Department Head will need to do or keep in mind. (Note: TAP exams are always developed and administered by TCTC faculty unless otherwise approved by the division chairman and dean of instruction.)

1. Identify someone in the department who will coordinate the testing process (faculty member or department head).

2. Arrange date, time, and location of exam; obtain any necessary approvals for use of testing room (e.g., Al Norris' approval for use of the Student Center).

3. Determine if students will be allowed to practice on TCTC equipment prior to test (e.g., typewriters for SSC exams); provide all necessary information on when, where, contact person, and any "sign-up" procedures for using TCTC equipment (include this along with information provided in item 5).

4. Develop or review testing application form. (See sample from Business/Office Systems Technology in **APPENDIX E.**) Application items might include:

   - student's name, address, phone number, SSN, date of birth, school and/or career center, grade, teacher's name;

   - release for student and parents to sign so TAP exam grade can be given to the high school;

   - reminder about procedures/paperwork that must be completed before taking exam (e.g., submission of high school teacher's recommendation, evidence that appropriate H.S. course(s) have been completed with necessary grade, etc.);

- reminder that a complete list of all TAP procedures is in the TAP booklets available from their counselor, teacher, or from TCTC;
- explanation that student will be notified if his/her application for testing is approved and he/she will also receive additional information about the test;
- include the name(s) of the TAP exams on the application form and ask students what TCTC program they plan to apply to. (Because, for example, the student could be applying to take the ACC 101 exam but planning to enter Computer Technology.)

5. Send information packet to high schools/career center counselors and appropriate teachers (see sample in **APPENDIX F**). Information packet might include:

   - sheets describing all TAP procedures for the department. (These sheets could be taken directly from the TAP booklets published for students.);
   - title of exam(s), date, time, location;
   - information on how students should apply for testing;
   - copies of test applications;
   - name of TCTC person to contact if there are questions;
   - information on any opportunities for students to practice on TCTC equipment (if appropriate).

6. Verify that students who plan to take the exam have completed TAP procedures prerequisite to taking the exam.

7. Determine which students will be approved for testing.

8. Notify students who've been approved for testing by sending either a postcard or a form letter (see **APPENDIX G**). Notification card/letter should describe:

   - date, time, location of test;
   - campus map and parking;
   - approximate time needed to complete test;

Suggested Procedures For Administering TAP Exams (continued)

- materials students should bring with them (or statement that all supplies will be provided);
- there is no charge for testing;
- requirement to bring photo identification in order to take exam*;
- when test results should be available and how they will be notified.

9. Notify any students who applied to take the TAP exam but were not approved for testing; indicate why they were not approved to take the exam (e.g. did not complete TAP procedures that were prerequisite to taking the exam). See example in **APPENDIX G.**

10. Notify appropriate people on campus (security, Admissions, Con't Ed, etc.) of date, time, location, and person in charge of testing (e.g., "ACC 101 TAP exam will be administered March 20 at 2:00 in the Student Center. Questions should be directed to Dave Russ.")

Suggested Procedures After TAP Exams Have been Administered and Scored. After administering and scoring the TAP exams, the department head (or faculty member overseeing the testing process) should:

1. Record scores alphabetically by student name and include name of each student's high school, H.S. teacher's name, date of testing, and students' SSNs. Be sure test score summary is kept for one year from test date.
2. Send the score summary to the division chairman. (The division chairman will forward a copy to the PACE office.)
3. Determine where high school summary reports should be sent and then send score report.

---

* Whether or not students need a photo ID is up to the department head. One reason to require ID is to avoid someone else taking the exam for the student (since TCTC faculty will not know the students they are testing).

Suggested Procedures After TAP Exams Have been Administered and Scored. (continued)

4. Send students their TAP scores (include what the passing score is). Attach score to a sheet with these reminders (see sample in **APPENDIX H**):
    - credit is awarded when all TAP procedures have been completed--refer to the TAP booklet to see if there are additional steps that need to be completed;
    - when students have completed all procedures, they'll receive a "student exemption form";
    - students who did not pass the TAP exam will NOT be allowed to retake the exam.
5. Check each student's TAP file, indicate either satisfactory or unsatisfactory completion of TAP exam.
6. Determine which students have successfully completed all TAP procedures.
7. Send completed exemption forms to the Student Record's Office. (Be sure to date and sign the form!)

RESPONSIBILITIES OF ACADEMIC ADVISORS

All advisors.

1. Ask incoming students (any student new to the department) whether or not they've earned any exemption credit through TAP or other types of advanced standing.
2. If student indicates that he/she has received TAP credit, verify that information by asking to see a copy of the exemption form or by calling Student Records (or seeing if verification is listed on data sheet).
3. Check "Advising Reports" for continuing students to see if credit appears for a course that would normally be taken in quarters other than the first quarter. (Example: student might have received credit for ACC 102.)

University Transfer Advisors.

1. Remind students that credit awarded through TAP can be used as elective credit for the AA/AS degree, but they should not plan on having that credit transfer (or check with the four-year college to determine transferability).

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RESPONSIBILITIES OF STUDENT RECORDS' STAFF, COUNSELORS, PACE STAFF

Responsibilities of Student Records Office. Student Records' staff will also have an important role to play in how smoothly the TAP program operates. Responsibilities of this area include:

1. Keep on file all Student Course Exemption Forms submitted by department heads for one year from date appearing on form.
2. Enter all exemptions based on TAP as soon as possible after student enrolls and ensure that credit appears accurately on transcripts.
3. Assist advisors, department heads, counselors, and others who may need to know whether or not a form is on file and the courses for which the student has received credit. (This will be important for incoming students since there won't be a computer-generated record of the credit until after the student's first active quarter.)
4. Assist PACE staff by providing access to the files so reports can be written and distributed to school districts and TCTC administrators.

Responsibilities of admissions counselors.

1. Ask incoming students if they've received TAP credit and indicate on data sheets any credit that the student claims to have earned. (If the student shows the counselor an exemption slip, verification of credit should be indicated on the data sheet so the advisor/department head doesn't have to verify the same information.)

Responsibilities of PACE staff.

1. Assist division chairmen and department heads in the development, implementation, and evaluation of articulation agreements and TAP procedures.
2. In association with division chairmen and the dean of instruction, publish and disseminate TAP booklets to high schools and career centers.
3. Plan and coordinate evaluation and reporting activities on the overall process and disseminate reports to TCTC administrators and school district personnel.
4. Assist the registrar in issues regarding the reporting of credit and the computer-related issues of recording credit on official transcripts.

Responsibilities of PACE staff. (continued)

5. Assist division chairmen and/or department heads in evaluating the effectiveness of TAP procedures and monitoring progress of students in second-level courses.

6. In association with division chairmen, keep the dean of instruction and dean of students informed on all aspects of articulation and TAP.

7. In association with division chairmen and department heads, ensure that counselors and TRIO staff are kept informed on all aspects of TAP.

8. Serve as a "clearinghouse" for issues, problems, and concerns associated with articulation and TAP.

9. Assist the Executive Vice President to coordinate the biennial review of the Memoranda of Agreement between Tri-County Technical College and the school districts of Anderson, Oconee, and Pickens counties.

EVALUATION AND REPORTING OF RESULTS

There are basically two types of evaluation associated with articulation and TAP:

1. Evaluation of the TAP procedures to determine that participating students have been appropriately identified, that the necessary competencies are effectively assessed, and that students are successful in the next higher-level courses. This type of evaluation would be conducted at the department level with assistance, as needed, from the division chairman and PACE staff.

2. Evaluation of the entire process including how many students apply for TAP, receive TAP, actually enroll in TCTC programs and the total numbers of credit hours awarded. This type of evaluation is conducted by the PACE staff.

Most of the reporting would be based on the second type of evaluation as indicated above. The PACE staff compiles reports on the overall TAP process and disseminates these reports (by the end of September of each academic year) to:

- TCTC administrators (executive vice president, dean of instruction, dean of students, division chairmen);

- School districts (assistant superintendents for instruction, career center directors, district-level vocational directors, principals, and others as requested by school district officials).

PROBLEMS, CONCERNS, IDEAS FOR IMPROVING TAP PROCEDURES

Since articulation and TAP are new to most of us at Tri-County, there are bound to be problems or concerns that arise with the procedures or other aspects of the process. There will also be ideas on how the program can be improved or how the procedures can be made simpler. Department heads, advisors, counselors, and others who notice problems or who have ideas for improvements are encouraged to contact their division chairman or one of the PACE staff members.

APPENDIX A

Appendix A

FORM NO. 7

STUDENT COURSE EXEMPTION

1. NAME Doe (LAST) John (FIRST) M. (MIDDLE) 2. SOC. SEC. NO. 010-22-4322

3. EXEMPTED COURSE TITLE	4. EXEMPTED COURSE NO.	5. SUBSTITUTE COURSE TITLE OR BASIS FOR EXEMPTION	6. RELATED DEPT. HEAD SIGNATURE	7. GRADE
Prin of Acc I	ACC 101	JAP	Jane Luss	E

CURRICULUM 8.	9. DAY ☐ NIGHT ☐	STUDENT'S DEPT. HEAD SIGNATURE 10. Jane Luss	DATE 11. 6/2/89
COMPUTER CENTER 12.	DATE 13.	STUDENT RECORDS 14.	DATE 15.

NOTE: ATTACH COPIES OF EXEMPTION RECORDS, SUCH AS: TRANSCRIPTS, DIPLOMAS, CERTIFICATIONS, VERIFICATIONS, OR EXAMINATIONS.

APPENDIX B

NAME [redacted]
STUDENT NUMBER [redacted] BIRTH [redacted]

Tri-County Technical College
PENDLETON, SOUTH CAROLINA

Tech Ed Academic Record

Secondary Schools:
D.W. DANIEL HIGH SCHOOL 09/85 - 06/89

Program:
BUSINESS & HUMAN SERVICES
ASSOCIATE IN BUSINESS
Major: SECRETARIAL SCIENCE

Exempt Credit Applied to FALL 1989
TECHNICAL ADVANCED PLACEMENT

COURSE NUMBER	COURSE TITLE	GRADE	CREDIT HOURS	QUALITY POINTS
	TYPING I		4.5	
	TYPING II		4.5	
	Transfer/Exempt Credit Total		9.0	

---------- FALL 1989 ----------

Admitted Program:
BUSINESS & HUMAN SERVICES
ASSOCIATE IN BUSINESS
Major: SECRETARIAL SCIENCE

COURSE NUMBER	COURSE TITLE	GRADE	CREDIT HOURS	QUALITY POINTS
SSC -161	SHORTHAND I	A	4.5	18.0
SSC -113	PERSONAL DEVELOPMENT	A	3.0	12.0
SSC -159	TYPING III	B	4.5	13.5
SSC -193	DATA ENTRY MACHINES	B	4.5	13.5

	AHRS	EHRS	QHRS	QPTS	GPA
Current	16.5	16.5	16.5	57.0	3.455
Cumulative	16.5	25.5	16.5	57.0	3.455

** End of Tech Ed Record **

KEY
- R REPEATING COURSE
- * COURSE NOT APPLIED TO CURRENT PROGRAM
- ** INCLUDES INITIAL STATISTICS

Lorrain C. Frith
OFFICIAL SIGNATURE

[redacted]

PAGE 1 OF

12/05/8
Officia
Academic R

Federal law prohibits access to this record by any party without written consent of the student.

Official transcripts bear signature stamp embossed with university seal.

APPENDIX C

Appendix C

SAMPLE

TECHNICAL ADVANCED PLACEMENT PROCEDURES CHECKLIST

Department: Business Technology (Accounting)

Student's full name: Susan Marie Smith

SSN: 140-12-1234

School: West-Oak **Grade:** 12

Career Center: Hamilton

Teacher's name: Mrs. Jones

TAP PROCEDURES

1. 1st and 2nd year Accounting/Bookkeeping
2. Completed competency checklist from teacher
3. Completion of TAP exam with grade of "B" or above
4. ______

Dates student completed procedures prerequisite to TAP Exam:

1. 3/14/89
2. 3/16/89
3. ______
4. ______

4/1/89 TAP application mailed to student

4/10/89 Testing approval notice/testing information sent to student

5/1/89 TAP exam completed for ACC 101; score: B

5/8/89 Tap exam completed for ACC 102; score: B

______ Tap exam completed for ______; score: ______

______ Tap exam completed for ______; score: ______

6/1/89 CREDIT AWARDED FOR: ACC 101, 102; EXEMPTION SLIP SENT TO STUDENT RECORDS

6/5/89 COPY OF EXEMPTION SLIP AND INFORMATION SHEET SENT TO STUDENT

6/5/89 Copy of exemption slip filed in department records

Mary Russ
(signature)

6/5/89
(date)

TECHNICAL ADVANCED PLACEMENT
PROCEDURES CHECKLIST

Department: ____________________

Student's full name: ____________________

SSN: ____________________

School: ____________________ Grade: ____________

Career Center: ____________________

Teacher's name: ____________________

TAP PROCEDURES

1. ____________________
2. ____________________
3. ____________________
4. ____________________

Dates student completed procedures prerequisite to TAP Exam:

1. ________
2. ________
3. ________
4. ________

________ TAP application mailed to student

________ Testing approval notice/testing information sent to student

________ TAP exam completed for ____________; score: ____________

________ Tap exam completed for ____________; score: ____________

________ Tap exam completed for ____________; score: ____________

________ Tap exam completed for ____________; score: ____________

________ CREDIT AWARDED FOR: ____________________;
EXEMPTION SLIP SENT TO STUDENT RECORDS

________ COPY OF EXEMPTION SLIP AND INFORMATION SHEET SENT TO STUDENT

________ Copy of exemption slip filed in department records

____________________ (signature)

____________________ (date)

APPENDIX D

BEST COPY AVAILABLE

Appendix D

FORM NO. 7

STUDENT COURSE EXEMPTION

1. NAME Jones (LAST) Mary (FIRST) S. (MIDDLE) 2. SOC. SEC. NO. 212-00-1234

3. EXEMPTED COURSE TITLE	4. EXEMPTED COURSE NO.	5. SUBSTITUTE COURSE TITLE OR BASIS FOR EXEMPTION	6. RELATED DEPT. HEAD SIGNATURE	7. GRADE
Prin of Acc I	ACC101	TAP	Jane Russ	E

CURRICULUM 8.	9. DAY ☐ NIGHT ☐	STUDENT'S DEPT. HEAD SIGNATURE Jane Russ	DATE 12/10/89 11.

COMPUTER CENTER	DATE	STUDENT RECORDS	DATE
12.	13.	14.	15.

NOTE: ATTACH COPIES OF EXEMPTION RECORDS, SUCH AS TRANSCRIPTS, DIPLOMAS, CERTIFICATIONS, VERIFICATIONS, OR EXAMINATIONS.

Congratulations! You have completed all the required Technical Advanced Placement (TAP) procedures and have been awarded credit for the Tri-County Technical College courses listed above.

There are some things you need to understand about earning credit through TAP. **PLEASE READ THE ITEMS BELOW VERY CAREFULLY.**

- The credit is good for one year from the date appearing on the exemption form; once you register and complete a term at Tri-County, the credit then becomes part of your permanent record;
- The credit will appear on your official Tri-County Technical College transcript at the end of your first active term;
- Only the credit hours earned will show on your transcript--you will not receive a grade and your GPA (grade average) at Tri-County will not be affected;
- You may use the credit you've earned in one of two ways at Tri-County: 1) for a required course if that course is listed in the College catalog for the degree program you enter; or 2) for an elective course in an associate degree program with permission of your program department head;
- The credit you've been awarded applies only to Tri-County programs. If you plan to transfer from Tri-County to another college, you should be aware that exemption credit will most likely not be accepted. (Other colleges have their own versions of TAP and each college determines whether or not it will accept exemption credit awarded by other colleges.)
- IT IS YOUR RESPONSIBILITY TO TELL YOUR ACADEMIC ADVISOR AT TRI-COUNTY THAT YOU'VE EARNED TAP CREDIT WHEN YOU COME TO REGISTER FOR YOUR FIRST TERM.

BE SURE TO BRING YOUR EXEMPTION FORM WITH YOU TO REGISTRATION!

Jane Russ
Department Head, Business Technology
Tri-County Technical College

12/15/89
Date

(attach course exemption form here)

Congratulations! You have completed all the required Technical Advanced Placement (TAP) procedures and have been awarded credit for the Tri-County Technical College courses listed above.

There are some things you need to understand about earning credit through TAP. **PLEASE READ THE ITEMS BELOW VERY CAREFULLY.**

- The credit is good for one year from the date appearing on the exemption form; once you register and complete a term at Tri-County, the credit then becomes part of your permanent record;
- The credit will appear on your official Tri-County Technical College transcript at the end of your first active term;
- Only the credit hours earned will show on your transcript--you will not receive a grade and your GPA (grade average) at Tri-County will not be affected;
- You may use the credit you've earned in one of two ways at Tri-County: 1) for a required course if that course is listed in the College catalog for the degree program you enter; or 2) for an elective course in an associate degree program with permission of your program department head;
- The credit you've been awarded applies only to Tri-County programs. If you plan to transfer from Tri-County to another college, you should be aware that exemption credit will most likely not be accepted. (Other colleges have their own versions of TAP and each college determines whether or not it will accept exemption credit awarded by other colleges.)
- IT IS **YOUR RESPONSIBILITY** TO TELL YOUR ACADEMIC ADVISOR AT TRI-COUNTY THAT YOU'VE EARNED TAP CREDIT WHEN YOU COME TO REGISTER FOR YOUR FIRST TERM.

BE SURE TO BRING YOUR EXEMPTION FORM WITH YOU TO REGISTRATION!

Department Head, ____________________ Tri-County Technical College	Date

APPENDIX E

Appendix E

SAMPLE

Tri-County Technical College
Technical Advanced Placement (TAP) Program
Application for Testing

Name: ____
(first) (middle) (last)

Address: ______________________________________ Phone: ____________

Social Security Number: ______________________ Date of Birth: ______________

High School: ______________________________

If you take classes at a Career Center, which center do you attend? ______________________

The scheduled TAP exams and testing dates are listed in the "General Information Sheet" which you should have received with this application. Please read that information carefully and then check (✓) which of the following TAP exams you are applying to take:

- ☐ Typing
- ☐ Shorthand
- ☐ Office Practice
- ☐ Principles of Accounting I (ACC 101)
- ☐ Principles of Accounting II (ACC 102)

You must have a competency checklist completed by your high school teacher for each test area before you will be approved for testing. Please tell us the name of teacher(s) who will be sending competency checklists for you in each of the areas you plan to test:

Typing ______________________________
(print teacher's name who will send competency checklist)

Shorthand ______________________________
(print teacher's name who will send competency checklist)

Office Practice ______________________________
(print teacher's name who will send competency checklist)

ACC 101 ______________________________
(print teacher's name who will send competency checklist)

ACC 102 ______________________________
(print teacher's name who will send competency checklist)

You will be sent information on the results of your TAP exam(s) approximately four weeks from the test date. Please complete the information below so that your test results can also be sent to your teacher(s).

Tri-County Technical College has my permission to send my TAP exam results to the teacher(s) who recommended me for this program.

Student's signature: ______________________________ Date: ____________

Parent or Guardian Signature: __________________________ Date: ____________

(The Completed Application Form Should Be Returned To Your Teacher)

637/dl

APPENDIX F

Appendix F

TRI-COUNTY TECHNICAL COLLEGE
TECHNICAL ADVANCED PLACEMENT (TAP)

MATERIALS PACKETS FOR TEACHERS AND COUNSELORS

The materials listed below have been included in packets mailed to teachers and directors of counseling concerning the Technical Advanced Placement Program for accounting and secretarial science.

If any materials are missing from the packet you have received, or if you need additional copies of any of the materials, please contact:

> Ms. Brenda Rice, Secretary, Business and Human Services Division, Tri-County Technical College (College numbers: 225-2250, 882-4412, 859-7033, 646-8361)

PLEASE MAIL ALL MATERIALS FIRST CLASS BY FRIDAY, APRIL 28.

Packets for Teachers

1 sheet - "Information and Materials for Teachers and Counselors"

10 copies - "General Information Sheet"

6 copies - "Extend Your Reach" Booklets

10 copies - competency checklists for each testing area

10 copies - "Testing Application"

1 pre-addressed mailing envelope

10 copies of TCTC location and campus map

Packets for Directors of Counseling

1 sheet - "Information and Materials for Teachers and Counselors"

3 copies - "General Information Sheet"

3 copies - "Extend Your Reach" Booklets

3 copies - competency checklists for each testing area

3 copies - "Testing Application"

3 copies of TCTC location and campus map

TRI-COUNTY TECHNICAL COLLEGE
TECHNICAL ADVANCED PLACEMENT (TAP) PROGRAM

Information and Materials for Teachers and Counselors

Procedures have recently been completed to award Tri-County Technical College credit in the areas of secretarial science and accounting to qualified high school students. These procedures were identified by articulation committees comprised of College and high school faculty.

In order to help students complete all procedures successfully, it is recommended that teachers do the following:

1. Read over the enclosed procedure sheets for accounting and secretarial science contained in the "Extend Your Reach" booklet and the enclosed "General Information Sheet."
2. Identify students who are qualified/interested in earning TCTC credit in one or both areas. Give participating students the "Extend Your Reach" booklets, the "General Information" sheets, the "Application for Testing" forms, and review with them the steps they must complete.
3. Complete enclosed competency checklists for each student that you are recommending. Mail completed checklists in the envelope provided to the Division secretary so they are received no later than May 1, 1989.
4. Have the students you are recommending complete the "Application for Testing" and mail completed applications along with competency checklists.

TAP EXAMS FOR ACCOUNTING 101 AND TYPING WILL BE ADMINISTERED ON SATURDAY, MAY 13 AT 9:00 A.M.; EXAMS FOR ACCOUNTING 102, SHORTHAND, AND OFFICE PRACTICE WILL BE GIVEN ON SATURDAY, MAY 20 AT 9:00 A.M. Exams will be given on the TCTC campus in the following locations:

SECRETARIAL SCIENCE:	Pickens Hall, room 111
ACCOUNTING:	Pickens Hall, room 117

If you have any questions about these procedures, or any of the material provided in this packet, please contact the appropriate TCTC department head:

Secretarial Science: Mrs. Martha Robinette, ext. 171
Accounting: Mr. Dave Russ, ext. 181

TELEPHONE NUMBERS

Anderson County:	225-2250
Anderson, Clemson, Pendleton:	646-8361
Oconee County:	882-4412
Pickens County:	859-7033

TRI-COUNTY TECHNICAL COLLEGE
TECHNICAL ADVANCED PLACEMENT (TAP) PROGRAM

General Information

TAP is a new program enabling qualified high school students to earn Tri-County Technical College (TCTC) credit in several areas. This information sheet explains the steps that students must complete to earn credit in secretarial science and/or accounting and gives general information on TAP and how earned credit may be used.

TAP PROCEDURES

If you are a high school senior and are interested in earning TCTC credit in accounting and/or secretarial science, you will need to do the following:

1. Read over the "Extend Your Reach" booklet.
2. Have your teacher fill-out a competency checklist which shows that you have the skills needed to take the TAP exam in your are of interest. Your teacher will send the completed forms to TCTC.
3. Fill-out the "Application for Testing" and give it to your teacher to be mailed to TCTC along with your competency checklist.

You will receive a postcard from TCTC telling you whether or not you have been approved for testing. ("Approval" means that all the necessary forms have been received and that there is a space available for you to test.) The postcard will contain the followin information: your testing date and time, location of exam, approximately how long the exam will take, parking information, and any materials you should bring with you.

TAP EXAMS ARE SCHEDULED FOR THE FOLLOWING DATES:

Principles of Accounting I (ACC 101) and Typing -
Saturday, May 13 at 9:00 a.m.
Principles of Accounting II (ACC 102), Shorthand, Office Practice-
Saturday, May 20 at 9:00 a.m.

SPECIAL NOTES ON TESTING:

- there is no charge to take TAP exams
- when you come to take a TAP exam, YOU MUST BRING your "Testing Approval" postcard that will be sent to you from TCTC AND some identification that has your picture and your signature on it. (If you don't bring an acceptable I.D. with you, you will NOT be allowed to take the TAP exam.)
- if you are planning to take the secretarial exam and would like to practice on Tri-County's equipment, the labs will be open from 2:00 p.m. until 5:00 p.m., Monday through Thursday. The labs are located in Pickens Hall, room 106 and 111. You don't have to make

an appointment. If you need assistance when you're using the labs, one of the secretarial science instructors is usually available in the department office (Pickens Hall, room 115).

TAP CREDIT

1. If you successfully complete all procedures and earn a passing grade on the TAP exams (note: students who don't pass TAP exams will not be allowed to re-take those exams), you will receive a TCTC Course Exemption Form telling you what credit you have earned.

2. Credit earned through TAP applies only to required or elective courses* in TCTC programs. If you earn TAP credit for a required course, or for an approved elective, it will apply to TCTC graduation requirements in the appropriate associate degree program. TAP credit earned for required courses in TCTC diploma or certificate programs will apply to graduation requirements in those programs. NOTE: If you are planning to enter or transfer to another college, you should NOT try to earn credit through TAP.

3. Credit earned is good for one year from the date it is awarded.

4. You must enroll (be accepted and register for classes) at TCTC in order to have the credit show on your TCTC transcript. Once you enroll, the credit becomes part of your permanent TCTC record, just as if you took the class at the College.

5. Credit earned will be listed on TCTC transcripts with a grade of "E" which means exempt. "E" grades earn credit hours but do not affect the grade average.

---

*elective course may require the program department head's approval. Elective courses are not available in diploma or certificate programs.

(April 14, 1989)

APPENDIX G

Appendix G

SAMPLE

TRI-COUNTY TECHNICAL COLLEGE

P. O. Box 587 • Pendleton • South Carolina • 29670

TECHNICAL ADVANCED PLACEMENT (TAP) PROGRAM

APPROVAL FOR TESTING

Student's Name: John A. Doe

Student's Social Security Number: 000-10-2345
(IF THIS IS BLANK, PLEASE FILL IN INFORMATION.)

You have been approved to take the ACC 101 TAP exam.

PLEASE READ CAREFULLY THE INFORMATION BELOW.

- The exam will be given on Saturday, May 5, 1990;
- The testing location will be: Pickens Hall, room 108 on the Tri-County Technical College campus.
- Please report to the testing room by 9:00 a.m. (if you arrive later than that, you may not be permitted to take the test);
- The exam should take you approximately 1½ hrs. to complete;
- Please note the approved parking areas on the enclosed campus map.
- You should bring the following items with you to take the TAP exam: photo identification;
- THERE IS NO CHARGE TO TAKE THE TAP EXAM.
- You will be notified by mail of your test results approximately 3 weeks after the testing date.

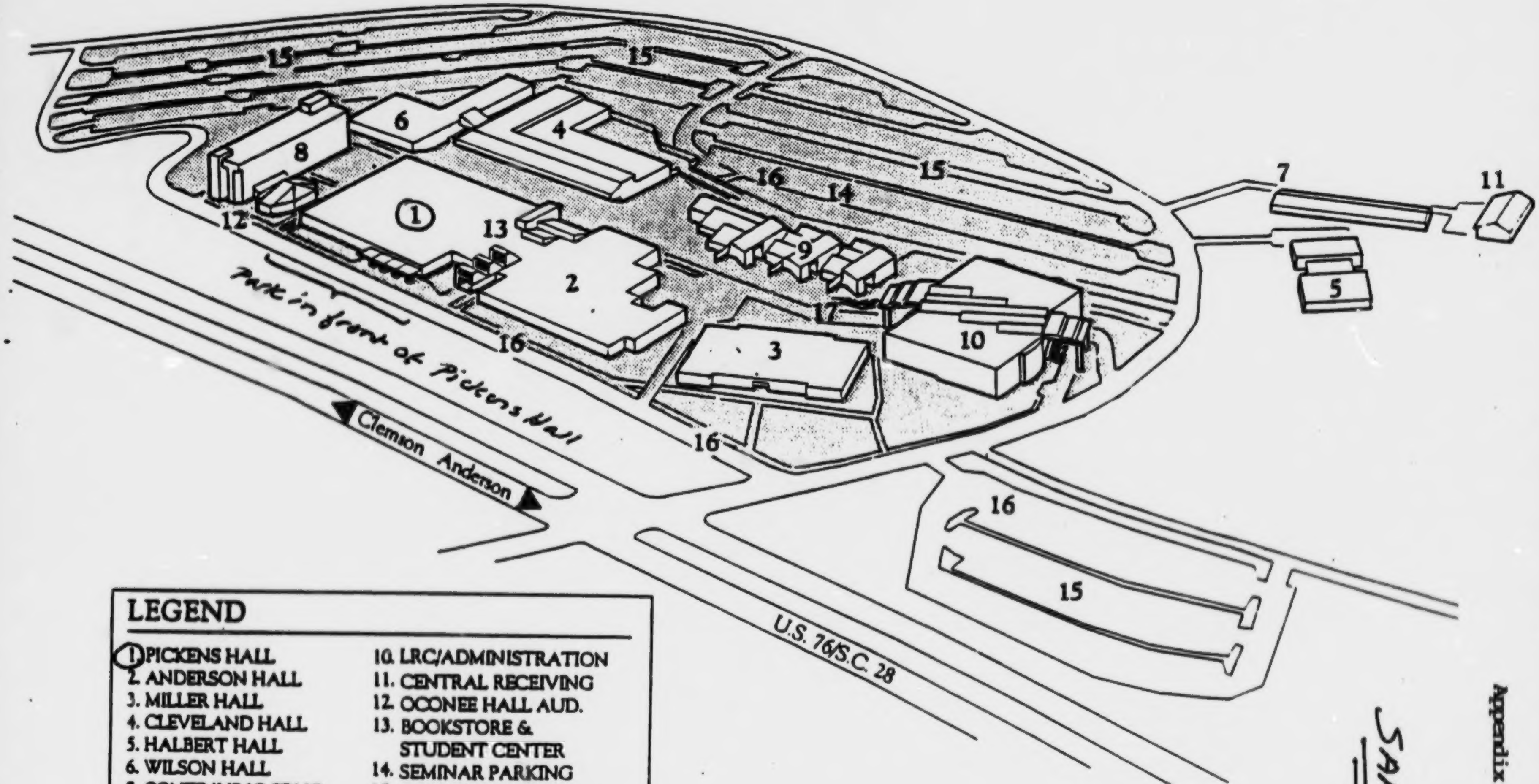
IF YOU HAVE ANY QUESTIONS, PLEASE CALL Dave Russ AT ONE OF THE NUMBERS LISTED BELOW. ASK FOR EXTENSION 2181.

TELEPHONES:
Anderson County 225-2250
Oconee County 882-4412
Pickens County 859-7033
Clemson - Pendleton -
Anderson 646-8361
Main Number 646-8361

PRESIDENT: Don C. Garrison

COMMISSION: Anderson County - J. B. [illegible], Chairman, James R. Fowler, Larry B. Miller
Oconee County - Dean P. Breazeale, Bruce A. Norton, J. D. Rutledge
Pickens County - Ben Childress, Dr. Mendel H. Stewart, Mary D. Dusenberry

TRI-COUNTY TECHNICAL COLLEGE
Campus Map


15
15
15
6
4
8
16
14
1
12
13
9
2
7
11
5
17
10
3
16
16
Park in front of Pickens Hall
Clemson
Anderson
16
15
U.S. 76/S.C. 28

LEGEND

1. PICKENS HALL
2. ANDERSON HALL
3. MILLER HALL
4. CLEVELAND HALL
5. HALBERT HALL
6. WILSON HALL
7. CONTINUING EDUC.
8. OCONEE HALL
9. CLARKE HALL
10. LRC/ADMINISTRATION
11. CENTRAL RECEIVING
12. OCONEE HALL AUD.
13. BOOKSTORE & STUDENT CENTER
14. SEMINAR PARKING
15. STUDENT PARKING
16. FACULTY/STAFF PARKING
17. AMPHITHEATER

Appendix G

SAMPLE

TECHNICAL ADVANCED PLACEMENT (TAP) PROGRAM

APPROVAL FOR TESTING

Student's Name: ____

Student's Social Security Number: ____________________________
(IF THIS IS BLANK, PLEASE FILL IN INFORMATION.)

You have been approved to take the _____________ TAP exam.

PLEASE READ CAREFULLY THE INFORMATION BELOW.

- The exam will be given on ____________________________________;
- The testing location will be: _____________ Hall, room ______ on the Tri-County Technical College campus.
- Please report to the testing room by _____________ (if you arrive later than that, you may not be permitted to take the test);
- The exam should take you approximately ________ to complete;
- Please note the approved parking areas on the enclosed campus map.
- You should bring the following items with you to take the TAP exam: ____;
- THERE IS NO CHARGE TO TAKE THE TAP EXAM.
- You will be notified by mail of your test results approximately ____ weeks after the testing date.

IF YOU HAVE ANY QUESTIONS, PLEASE CALL ______________________ AT ONE OF THE NUMBERS LISTED BELOW. ASK FOR EXTENSION _____________.

SAMPLE

TRI-COUNTY TECHNICAL COLLEGE
P. O. Box 587 • Pendleton • South Carolina • 29670

TECHNICAL ADVANCED PLACEMENT (TAP) PROGRAM

Student's Name: John A. Doe

We have reviewed your application to take the ACC101 TAP exam scheduled for May 5.

We regret to inform you that your application has not been approved for the reasons listed below:

We haven't received your competency checklist from your accounting teacher.

IF YOU HAVE ANY QUESTIONS, PLEASE CALL Jane Russ AT ONE OF THE TELEPHONE NUMBERS LISTED BELOW. ASK FOR EXTENSION 2181.

John -

If you can get the competency checklist from your teacher and bring it to my office (Cleveland Hall, room 126) by 4pm on Friday, May 4, I can approve your application for testing.

-Jane Russ
5/1/90

TELEPHONES:
Anderson County 225-2250
Oconee County 882-4412
Pickens County 859-7033
Clemson - Pendleton -
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Pickens County - Ben Childress, Dr. Mendel H. Stewart, Mary D. Dusenberry

TECHNICAL ADVANCED PLACEMENT (TAP) PROGRAM

Student's Name: ______________________________

We have reviewed your application to take the __________ TAP exam scheduled for _______________.

We regret to inform you that your application has not been approved for the reasons listed below:

____

____

____

IF YOU HAVE ANY QUESTIONS, PLEASE CALL _____________________ AT ONE OF THE TELEPHONE NUMBERS LISTED BELOW. ASK FOR EXTENSION _____

APPENDIX H

Appendix H

SAMPLE

TRI-COUNTY TECHNICAL COLLEGE

P. O. Box 587 • Pendleton • South Carolina • 29670

TECHNICAL ADVANCED PLACEMENT (TAP) PROGRAM

TAP EXAM SCORE REPORT

Student's Name: John A. Doe

Name of TAP exam taken: ACC 101

Student's score: 4 (The passing score for this exam is: B)

PLEASE READ CAREFULLY THE INFORMATION BELOW.

- Course credit is awarded when you have completed all the necessary TAP procedures. Please check the Technical Advanced Placement Student Guide to see whether or not you have additional steps to complete.

- When you have completed all TAP procedures, you will receive a Tri-County Technical College Student Course Exemption Form. This form will list the courses for which you have been awarded credit. Additional information on TAP credit will be sent to you along with the exemption form--read that information very carefully!

- If you did not pass the TAP exam, you will not be permitted to re-take the exam at a later date. This means that you should plan on enrolling in the course once you enter Tri-County Technical College.

IF YOU HAVE ANY QUESTIONS, PLEASE CALL Joye Russ AT ONE OF THE TELEPHONE NUMBERS LISTED BELOW. ASK FOR EXTENSION 2181.

TELEPHONES:
Anderson County 225-2250
Oconee County 882-4412
Pickens County 859-7033
Clemson - Pendleton -
Anderson 646-8361
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Pickens County - Ben Childress, Dr. Mendel H. Stewart, Mary D. Dusenberry

TECHNICAL ADVANCED PLACEMENT (TAP) PROGRAM

TAP EXAM SCORE REPORT

Student's Name: ______________________________

Name of TAP exam taken: ______________________

Student's score: _____ (The passing score for this exam is: _____)

PLEASE READ CAREFULLY THE INFORMATION BELOW.

- Course credit is awarded when you have completed all the necessary TAP procedures. Please check the Technical Advanced Placement Student Guide to see whether or not you have additional steps to complete.
- When you have completed all TAP procedures, you will receive a Tri-County Technical College Student Course Exemption Form. This form will list the courses for which you have been awarded credit. Additional information on TAP credit will be sent to you along with the exemption form--read that information very carefully!
- If you did not pass the TAP exam, you will not be permitted to re-take the exam at a later date. This means that you should plan on enrolling in the course once you enter Tri-County Technical College.

IF YOU HAVE ANY QUESTIONS, PLEASE CALL ____________________ AT ONE OF THE TELEPHONE NUMBERS LISTED BELOW. ASK FOR EXTENSION ________.

TECHNICAL ADVANCED PLACEMENT (TAP)

...opportunities for high school students to get a head start on college studies

STUDENT HANDBOOK

(1990-91)

Tri-County Technical College
P. O. Box 587
Pendleton, SC 29670
(646-8361)

Toll -Free Numbers:
Anderson County 225-2250
Oconee County 882-4412
Pickens County 859-7033

BEST COPY AVAILA

Three Easy Steps to Earning Technical Advanced Placement Credit...

Step 1 READ PAGES 6-8.

Step 2 Identify the courses for which you want to earn TAP credit (see list in Appendix B).

Step 3 Read the TAP procedure page(s) for each course that tell you everything you need to do to earn TAP credit.

TECHNICAL ADVANCED PLACEMENT (TAP) STUDENT HANDBOOK
(1990-91)

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INTRODUCTION

Tech Prep and Technical Advanced Placement

Tech Prep. Tech Prep is a new program designed to PREPare students for careers in TECHnologies. Tech Prep programs are being developed in Anderson, Oconee, and Pickens County high schools in cooperation with the Partnership for Academic and Career Education (PACE), a business-education organization involving the seven area school districts, local businesses and industries, the National Dropout Prevention Center at Clemson University, and Tri-County Technical College.

Tech Prep involves specific high school and two-year college courses which provide the background and training for rewarding careers in technologies--careers in technical, industrial, business, allied health, and public service fields.

Tech Prep involves:

- taking specially-designed, or enhanced, high school courses in math, English, and science (such as "Principles of Technology", an applied physics course now available in most schools) that provide the skills needed for two-year college occupational degree programs. These unique courses not only teach important math, English, and science skills but show how they are used in various careers.

- selecting and taking vocational or occupational courses in high school that provide important background information and skills for two-year college programs in related majors.

- providing qualified students with the opportunity to earn Tri-County Technical College (TCTC) credit through Technical Advanced Placement (TAP).

- providing students with a greater understanding of technology careers and the skills needed to be successful in today's demanding and competitive work place.

Several components of the Tech Prep program are available now in most area high schools. Over the next few years, the entire Tech Prep program will be available to all high school students in Anderson, Oconee, and Pickens counties.

Many other states also offer Tech Prep, or "2 + 2", programs linking high school and community college courses. In fact, there are now over 100 such programs in 33 states.

PLANNING WISELY FOR COLLEGE STUDIES

Suggestions For Students In Grades 9 - 11.

Your college and career planning can (and should!) start as early as possible because what you take in high school can save you time, money, and frustration in college and help you begin a rewarding career without unnecessary delays.

Academic Courses. Taking the right academic courses is very important, especially if you plan to participate in Technical Advanced Placement. By combining a solid academic foundation with advanced placement for vocational/occupational courses, you'll find that your first terms at Tri-County will go smoothly, that you'll be able to earn satisfactory grades in College courses, and that you won't have to spend time (and money!) gaining fundamental skills that you could have learned in high school.

Your school may have its own Tech Prep Guide which suggests academic courses that prepare you for success in two-year college majors. If so, follow those suggestions. Otherwise, here are some general guidelines to help you prepare for programs at Tri-County:

- take four units of mathematics;
- take three units of science (courses like physical science, physics, Principles of Technology, chemistry and/or biology);
- take the highest level of academic coursework you are capable of handling successfully;
- do your very best in English classes. (English skills are important for all college majors and career success!)

Because math skills are particularly important in all Tri-County programs, here are some specific recommendations:*

Engineering Technologies (AMT, EET, EGT, QAT)**	Algebra I, Geometry, Algebra II, Pre-Calculus (or courses listed in your school's Tech Prep Guide)
Industrial Technologies (IET, GT, IM, HVAC, MTT, TMT, WLD)**	Pre-Algebra, Algebra I, Geometry, Algebra II (or courses listed in your school's Tech Prep Guide)

---

* These are suggestions, not requirements for TCTC admission. If you don't take these courses, or need to brush up your basic skills, you can enter TCTC and take Comprehensive Studies courses.

** See **APPENDIX D** for an explanation of abbreviations.

Suggestions For Seniors

You should examine the academic and vocational courses you've taken in high school and answer these questions:

1. Have you taken any vocational/occupational courses that may qualify you for Technical Advanced Placement? (If the answer is "yes", then read the rest of this booklet carefully!)

2. Have you taken the math and English courses you need to be successful in a College program? (How well did you do in those courses?) If you think you may need to brush-up in math and English, consider taking some review classes in the summer before starting your College major in the fall. Call the Comprehensive Studies Division Office at Tri-County Technical College (ext. 2216) for more information.

3. Do you know what opportunities are available to help you pay for your two-year college education? (There are many opportunities such as co-op, Bosch Apprenticeship Program, Oconee Industries, scholarships, work-study, and other Federal financial aid programs. Just call Tri-County's Admissions Office [ext.2200] and they'll tell you how to get started.)

In Which Areas Can Students Earn Credit Through TAP?

If you've taken specific vocational or occupational courses in high school and you complete the procedures listed in this booklet, you may be able to earn credit in one or more of these Tri-County Technical College departments:

Arts and Sciences Division
- English
- Mathematics

Business and Human Services Division Departments
- Accounting/Management (Business Technology)
- Computer Technology
- Fashion Merchandising
- Office Systems Technology/Secretarial Science

Industrial and Engineering Technology Division Departments
- Electronics Engineering Technology
- Engineering Graphics Technology
- Heating, Ventilation, Air Conditioning Technology
- Industrial Electronics Technology
- Industrial Mechanics
- Machine Tool Technology
- Textile Management Technology
- Welding

Will There Be Other Areas In Which Students Can Earn TAP Credit?

Yes! Over the next few years, students may be able to earn credit in several other subject areas such as health occupations. As procedures are developed in these new areas, your guidance counselors will receive updated materials to help you understand all the opportunities available through TAP.

Where Can Students Receive More Information?

If you have questions about TAP, see your guidance counselor, vocational/career center teacher, or contact the appropriate department head listed on the TAP Procedures pages of this booklet.

What Steps Should Students Follow To Earn TAP Credit?

First, read very carefully pages 6 and 7 of this booklet, then:

1. Identify the Tri-County courses for which you want to try to earn TAP credit. (A complete list of all courses for TAP credit is available in **APPENDIX B.**)
2. Read the TAP Procedure page listing the course(s) you're interested in.
3. Follow all the steps carefully and ask questions whenever you need more information! (Your guidance counselor, vocational/career center teacher, or the Tri-County department head listed on the TAP Procedure page can help you.)

EXPLANATION OF TAP PROCEDURES

How TAP Procedures Are Developed.

TAP procedures (the steps you need to complete before earning TAP credit) are developed by teams of high school and Tri-County Technical College (TCTC) faculty who teach similar or equivalent courses. These faculty teams are called articulation committees and there's a committee formed for each subject area. The procedures developed by the committees are then approved by officials of Tri-County Technical College and the school districts of Anderson, Oconee, and Pickens counties. TAP procedures are also reviewed periodically by the articulation committees in order to ensure that the procedures are current and effective.

TAP Procedure Pages.

Technical Advanced Placement (TAP) procedures for eight Industrial and Engineering Technology Division programs, four Business and Human Services Division programs and two Arts and Sciences Division courses are described on pages 11 through 37 of this booklet.

Each TAP Procedure page contains the following information:

- brief description of the Tri-County Technical College (TCTC) program or major.
- list of high school courses that you must have completed or currently be taking in order to try for TAP credit.
- TCTC courses you can earn TAP credit for when you successfully complete all the procedures listed.
- list of the procedures you must complete in order to earn TCTC credit through TAP. (NOTE: The steps are not the same for all courses, so read the procedure list carefully for all courses you hope to earn TAP credit for!)
- list of the courses you'll take at Tri-County after you've earned TAP credit. (This means the courses you'll still need to complete in order to graduate from the program.) **NOTE**: The list assumes you've earned the maximum amount of TAP credit for the TCTC courses listed on that procedure page. If you earn TAP credit from another department, you may be able to use it for some of the other required or elective courses on the list.
- name of the degree you'll earn from Tri-County when you graduate.
- TCTC department head you should call if you have questions or if you need more information.

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ACCOUNTING

PROGRAM DESCRIPTION: As a student in the Business Technology Department's Accounting (ACC) program, you would:

- study traditional and computerized accounting procedures used by junior accountants and accounting technicians.
- receive instruction in accounting principles and their application to practical business situations.
- learn actual accounting practices by completing practice-sets manually and on the computer.

As an ACC graduate, you would be well qualified for such entry- level positions as accounting technician, junior accountant, and bookkeeper, among others!

IF YOU'VE COMPLETED OR ARE NOW TAKING THESE HIGH SCHOOL COURSES:

Accounting I AND Accounting II

YOU CAN EARN TAP CREDIT FOR THESE TCTC COURSES:

Principles of Accounting I (ACC 101)
Principles of Accounting II (ACC 102)

WHEN YOU COMPLETE THESE PROCEDURES:

1. Have a competency checklist completed by your high school/career center business teacher sent to Mrs. Brenda Rice, secretary, Business and Human Services Division. (You must have senior standing.)
2. Complete a TAP exam with a grade of "B" or better.

WHAT YOU WILL STUDY AT TCTC AFTER EARNING TAP CREDIT:*

FALL:
Communications I
Math for Business and Finance
Introduction to Business
Keyboarding Skills I

WINTER:
Basic Economics
Algebra Fundamentals
Communications II
Technology and the Humanities

SPRING:
Business Law I
Principles of Accounting III
Effective Speaking
Business Statistics

* Assumes maximum credit earned for TCTC courses listed above.

(OVER)

COMPUTER TECHNOLOGY

PROGRAM DESCRIPTION: As a Computer Technology (CPT) student, you would:

- receive instruction in computer utilization principles and their applications in business situations.
- learn programming languages and application packages on a variety of computer hardware.
- develop skills in data communications, data base management, operating systems, machine operation, and other competencies required in computer information services.

As a CPT graduate, you will be well qualified for such positions as entry-level programmer, computer operator and software support technician, among others!

TO EARN TAP CREDIT FOR MICROCOMPUTER APPLICATIONS I, FOLLOW OPTION A; TO EARN TAP CREDIT FOR INTRODUCTION TO COMPUTERS, FOLLOW OPTION B.

OPTION A

IF YOU'VE COMPLETED OR ARE NOW TAKING COURSES COVERING AT LEAST THREE OF THE FOLLOWING FOUR SOFTWARE AREAS*:

Operating Systems (PC-DOS or MS-DOS)
Word processing (WordPerfect 4.2 or 5.0)
Spreadsheets (VP-Planner Plus or LOTUS 1-2-3)
Data Management (dBASE III Plus or IV)

YOU CAN EARN TAP CREDIT FOR THIS TCTC COURSE:

Microcomputer Applications I (CPT 170)

WHEN YOU COMPLETE THESE PROCEDURES: (You must have senior standing.)

1. Have a competency checklist completed by your high school/career center teacher(s) sent to Ms. Brenda Rice, secretary, Business and Human Services Division. (NOTE: The competency checklist must indicate skills in at least 3 of the areas listed above so you may need to have more than one teacher complete the competency checklist.)
2. Develop skills on the remaining software area through independent study. (NOTE: If you have a competency checklist completed by your high school teacher(s) showing skills in all four areas, this procedure does NOT apply to you.)
3. Complete a TAP exam with a grade of "B" or above.

---

* High school courses which may provide you with skills in these areas could include Business Computer Applications, Advanced Office Information Systems, Word Processing, etc.

(OVER)

ELECTRONICS ENGINEERING TECHNOLOGY

PROGRAM DESCRIPTION: As a student in Electronics Engineering Technology (EET), you would:

- study electrical, mechanical, and computer-controlled systems in manufacturing and methods of installing and troubleshooting these systems.
- receive hands-on experience with fabricating and troubleshooting circuits, standard testing instrumentation, solid state devices, integrated circuits, and digital systems such as computers.
- learn principles of circuit and component behavior and applications of modern electronic equipment.

As an EET graduate, you would be well qualified for such entry-level positions as electronics technician, engineering technician and research technician, among others!

IF YOU'VE COMPLETED OR ARE NOW TAKING THESE HIGH SCHOOL COURSES:

Electricity/(Computer)Electronics I AND Electricity/(Computer)Electronics II

YOU CAN EARN TAP CREDIT FOR THESE TCTC COURSES:

DC Circuits	(EET 115)
AC Circuits	(EET 125)
Active Devices	(EET 131)

WHEN YOU COMPLETE THESE PROCEDURES:

1. Have a written recommendation from your high school vocational teacher sent to the EET department head.
2. Place into Algebra and Trigonometry I (MAT 111) with a passing score on the TCTC placement test.
3. Complete the Survey of Basic Electronics course at TCTC with a grade of "B" or better.

WHAT YOU WILL STUDY AT TCTC AFTER EARNING TAP CREDIT*:

FALL:
Communications I
General Chemistry I
Algebra and Trigonometry I

WINTER:
Interactive Computing I
Social or Behavioral Science
Algebra and Trigonometry II

SPRING:
Physics I
Analytic Geometry and Calculus I
Effective Speaking

* Assumes maximum credit earned for TCTC courses listed above.

(OVER)

ENGINEERING GRAPHICS TECHNOLOGY

PROGRAM DESCRIPTION: As a student in Engineering Graphics Technology (EGT), you would:

- study drafting and design of mechanical objects in manufacturing and apply principles to traditional drafting techniques and latest CADD/CAM (Computer-Aided Drafting and Design/Computer-Aided Manufacturing) software.
- receive hands-on experience with traditional drafting tools, the latest computer-aided drafting and design (CADD) equipment, and duplication equipment.
- learn principles of basic engineering and communications and applications of math and science.

As an EGT graduate, you would be well qualified for such entry-level jobs as computer-aided drafting operator and drafter, among others!

IF YOU'VE COMPLETED OR ARE NOW TAKING THESE HIGH SCHOOL COURSES:

Drafting I AND Drafting II

YOU CAN EARN TAP CREDIT FOR THESE TCTC COURSES:

Engineering Graphics I (EGT 111)
Engineering Graphics II (EGT 121)

WHEN YOU COMPLETE THESE PROCEDURES:

1. Have a written recommendation from your high school vocational teacher sent to the EGT department head.
2. Demonstrate skills, based on your TCTC placement test score, that would enable you to place into Intermediate Algebra or a higher level course. (**NOTE:** Intermediate Algebra is a basic skills course and cannot be applied toward the Associate Degree).
3. Present a portfolio of high school work demonstrating ability required in EGT 111 and EGT 121.

WHAT YOU WILL STUDY AT TCTC AFTER EARNING TAP CREDIT:*

FALL:	WINTER:	SPRING:
Communications I	Communications II	Microcomputer Applications
Algebra and Trigonometry I	Algebra and Trigonometry II	Introduction to Machine Tools
General Chemistry	Physics II	Physics I
		Engineering Graphics III

* Assumes maximum credit earned for TCTC courses listed above.

(OVER)

ENGLISH

DESCRIPTION: All degree, diploma and most certificate programs at Tri-County Technical College include courses in communications, mathematics, and social sciences/humanities as part of the requirements for graduation. These courses provide students with skills and concepts necessary for effective performance in careers requiring a well-rounded educational experience.

IF YOU'VE COMPLETED OR ARE NOW TAKING THIS HIGH SCHOOL COURSE:

English IV equivalent to a College Prep English course with emphasis on composition in which you have at least a grade of "C"

YOU CAN EARN TAP CREDIT FOR THIS TCTC COURSE:

Communications I (ENG 126)
and be exempt from TCTC's English placement testing for admission to programs for which ENG 126 is required (see listing on page 21.)

WHEN YOU COMPLETE THESE PROCEDURES:

1. Have your high school English teacher submit (to the English Department Head at Tri-County) a written recommendation which verifies that you have the following skills:
    a. Ability to write a well-organized, grammatically correct essay.
    b. Ability to use standard American English (no dialect or colloquialisms such as "ain't," "busted," "drowned."
    c. Ability to use appropriate endings (especially -s, -d, and -ed) on words.
    d. Ability to write appropriately for specific audience.
    e. Ability to use a collegiate dictionary.

2. Take and pass, with a grade of at least C- on each of the sections, a Technical Advanced Placement exam administered at Tri-County Technical College. The exam will consist of the following sections:
    a. Grammar
        1. fragments, comma splices, fused sentences
        2. verbs
        3. commas
        4. pronoun usage

(OVER)

DEGREE/MAJOR: Communications I (ENG 126) is a required course for the following TCTC majors: AMT, EET, EGT, QAT, GT, HVAC, IET, MTT, TMT, ACC, CPT, MGT, RTV, OST, CDA, CRJ, DTA, MLT, PN, SRT, VET and may be substituted for the required course in FSM. Communications I is not a required course for ADN and AA/AS.

FOR MORE INFORMATION:

Contact Dr. Marianne Taylor, English Department Head, 646-8361, ext. 2331. (Toll-free numbers are listed on the front cover of this booklet.)

FASHION MERCHANDISING

PROGRAM DESCRIPTION: As a student in Fashion Merchandising (FSM), you would:

- receive instruction in basic fashion terminology and the principles of fashion merchandising.
- learn creative fashion design, color, pattern, line and figure drawing.
- study textiles and textile processes from source of fiber to finished product.
- learn visual merchandising for a variety of products.

As an FSM graduate, you will be well qualified for such entry-level positions as retail buyer trainee, assistant manager, visual display coordinator, and fashion sales associate, among others!

IF YOU'VE COMPLETED OR ARE NOW TAKING THIS HIGH SCHOOL COURSE:

Fashion Merchandising

YOU CAN EARN TAP CREDIT FOR THESE TCTC COURSES:

Fashion Merchandising I (FSM 201) AND/OR
Twentieth Century Fashion (FSM 230)

WHEN YOU COMPLETE THESE PROCEDURES:

1. Have a competency checklist for each course completed by your high school/career center teacher(s) sent to Ms. Brenda Rice, secretary, Business and Human Services Division. (You must have senior standing.)
2. Complete a TAP exam (two-hour test) for each course with a grade of "B" or above.

WHAT YOU WILL STUDY AT TCTC AFTER EARNING TAP CREDIT*:

FALL	WINTER	SPRING
Language Appl. I	Customer Relations	Intro. to Business
Fashion Design	Marketing I	Psychology of Fashion
Basic Math Applications		Visual Merchandising
		Retailing

DEGREE/MAJOR: Certificate/Fashion Merchandising.

FOR MORE INFORMATION: Contact Mr. Dave Russ, Business Technology Department Head, 646-8361, ext. 2181. (Toll-free numbers are listed on the front cover of this booklet.)

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* Assumes maximum TAP credit awarded for TCTC courses listed above.

HEATING, VENTILATION, AIR CONDITIONING TECHNOLOGY

PROGRAM DESCRIPTION: As a student in Heating, Ventilation, Air Conditioning Technology (HVAC), you would:

- study methods of installing and servicing residential and industrial heating and cooling systems.
- receive hands-on experience with testing and repair of electrical, electronic, and mechanical controls, refrigeration systems, testin and balancing air cycles, fans and circulation devices, and maintenance of HVAC systems and duct fabrication.
- learn principles of refrigeration systems and cycles, the balancin of systems and air cycles, and government regulations for adequat ventilation.

As an HVAC graduate, you would be well qualified for such entry-level positions as refrigeration service technician and air-conditioning installer, among others!

IF YOU'VE COMPLETED OR ARE NOW TAKING THESE HIGH SCHOOL COURSES:

Air Conditioning/Heating/Refrigeration I AND
Air Conditioning/Heating/Refrigeration II

YOU CAN EARN TAP CREDIT FOR THESE TCTC COURSES:

Fundamentals of Refrigeration	(ACR 105)
Heating Fundamentals	(ACR 110)
Air Conditioning I	(ACR 136)
Basic Electricity	(ACR 116)
Automatic Controls I	(ACR 137)

WHEN YOU COMPLETE THESE PROCEDURES:

1. Have a written recommendation from your high school vocational teacher sent to the IM/HVAC department head.
2. Provide a list of task objectives to the IM/HVAC department head from your vocational teacher showing satisfactory grades in ACR I/II.

WHAT YOU WILL STUDY AT TCTC AFTER EARNING TAP CREDIT*

SUMMER:
- Principles of Air Conditioning
- Communications I
- Freehand Sketching and Blueprint Reading
- Social or Behavioral Science

FALL:
- Basic Electronics
- Load Calculations and Systems Design
- Communications II
- Heat Pump
- Pneumatic Controls

WINTER:
- Advanced Automati Controls
- Advanced Refrigeration
- Elective

---

* Assumes maximum credit earned for TCTC courses listed above. (Check with the IM/HVAC Department Head for exact course scheduling and entry possibilities.)

(OVER)

INDUSTRIAL ELECTRONICS TECHNOLOGY

PROGRAM DESCRIPTION: As a student in Industrial Electronics Technology (IET), you would:

- study installation and repair of electrical systems, machinery, and programmable logic controllers used in industry.
- receive hands-on experience with DC and AC circuits, all types of motors and generators, and electric power productions, transmission, and distribution.
- learn principles of fundamental electricity, basic electronics, digital logic, and programmable controls.

As an IET graduate, you would be well qualified for such entry-level positions as electrical technician, instrument technician, and industrial electronics technician, among others!

IF YOU'VE COMPLETED OR ARE NOW TAKING THESE HIGH SCHOOL COURSES:

Electricity/Electronics I AND Electricity/Electronics II

YOU CAN EARN TAP CREDIT FOR THESE TCTC COURSES:

Electricity (DC)	(EEM 113)
Electricity (AC)	(EEM 123)
Electronics and Applied Circuits	(EEM 131)

WHEN YOU COMPLETE THESE PROCEDURES:

1. Have a written recommendation from your high school vocational teacher sent to the IET department head.
2. Place into Elements of Algebra, Geometry, and Trigonometry (MAT 172) with a satisfactory score on the TCTC Placement test.
3. Complete the Survey of Basic Electronics course at TCTC with a grade of "C" or better.

WHAT YOU WILL STUDY AT TCTC AFTER EARNING TAP CREDIT:*

FALL:
Electronic Test Equipment
DC Computations

WINTER:
AC Computations
Electrical Codes and Ordinances I-A
Communications I

SPRING:
DC Machines and Control
Electrical Codes and Ordinances I-B
Conceptual Physics II

* Assumes maximum credit earned for TCTC courses listed above.

(OVER)

INDUSTRIAL MECHANICS

PROGRAM DESCRIPTION: As a student in Industrial Mechanics (IM), you would:

- study blueprint reading and the installation and maintenance of mechanical, electrical, and heating and cooling systems.
- receive hands-on experience with hand and power tools, reading and interpreting blueprints and technical manuals, the use of precision instruments, welding, rigging, pipefitting, and troubleshooting.
- learn principles and applications of electricity, hydraulics, pneumatics, simple machines, drive components, lubrication, and elements of force, motion, and friction.

As an IM graduate, you would be well qualified for such entry-level positions as electro-mechanical technician, utilities maintenance technician, line technician, and industrial maintenance technician among others!

IF YOU'VE COMPLETED OR ARE NOW TAKING THESE HIGH SCHOOL COURSES:

Industrial Maintenance I AND Industrial Maintenance II

YOU CAN EARN TAP CREDIT FOR THESE TCTC COURSES:

Curriculum courses in several Industrial Mechanics (IM) or Heating, Ventilation, Air-Conditioning (ACR) courses depending on your vocational program competencies.

WHEN YOU COMPLETE THESE PROCEDURES:

1. Have a written recommendation from your high school vocational teacher sent to the IM/HVAC department head.
2. Provide a list to the IM/HVAC department head from your vocational teacher of the competencies you completed during high school.

WHAT YOU WILL STUDY AT TCTC AFTER EARNING TAP CREDIT:*

FALL:	**WINTER:**	**SPRING:**
Industrial Maintenance Safety	Industrial Hand and Power Tools	Mechanical Power Components
Basic Electricity	Blueprint Reading and Sketching I	Applied Hydraulics and Pneumatics
Fundamentals of Refrigeration	Industrial Communications	Blueprint Reading and Sketching II
	Applied Mathematics I	Human Relations and Motivation

* Assumes maximum credit earned for TCTC courses listed above.

(OVER)

MACHINE TOOL TECHNOLOGY

PROGRAM DESCRIPTION: As a student in Machine Tool Technology (MTT), you would:

- study operation of metal-working equipment, principles of tool and die making, and basics of computer numerical control (CNC) and computer-aided manufacturing (CAM) systems.
- receive hands-on experience with hand and power tools, milling machines, lathes, grinders, drill presses, and sophisticated computer numerical control (CNC) equipment uses to shape metal into precision parts.
- learn the principles for building tools, dies, jigs, fixtures, gauges, and intricate mechanisms; and application of metallurgy and heat treatment.

As an MTT graduate, you would be well qualified for such entry-level positions as computer numerical control operator, tool and die apprentice, and machinist, among others!

IF YOU'VE COMPLETED OR ARE NOW TAKING THESE HIGH SCHOOL COURSES:

Machine Shop/Tool Operations I AND Machine Shop/Tool Operations II

YOU CAN EARN TAP CREDIT FOR THESE TCTC COURSES:

Toolroom Machining I	(MTT 112)
Toolroom Machining II	(MTT 122)
Toolroom Machining III	(MTT 132)
Toolroom Machining IV	(MTT 142)

WHEN YOU COMPLETE THESE PROCEDURES:

1. Have a written recommendation from your high school vocational teacher submitted to the MTT department head.
2. Successfully complete Tool and Die Making I (MTT 211) at TCTC.

WHAT YOU WILL STUDY AT TCTC AFTER EARNING TAP CREDIT:*

FALL:	WINTER:	SPRING:
Tool and Die Making I	Tool and Die Making II	Tool and Die Making III
Blueprint Reading and Sketching I	Mechanical Drafting I	Inter. of Engin. Drawing
Basic Die Theory	Effective Speaking	Jigs and Fixtures II
Math or Communications I	Jigs and Fixtures I	Math or Communications I
		Elective

* Assumes maximum credit earned for TCTC courses listed above.

(OVER)

MATHEMATICS

DESCRIPTION: All degree, diploma and most certificate programs at Tri-County Technical College include courses in communications, mathematics and social sciences/humanities as part of the requirements for graduation. These courses provide students with skills and concepts necessary for effective performance in careers requiring a well-rounded educational experience.

IF YOU HAVE COMPLETED OR ARE NOW TAKING THIS HIGH SCHOOL COURSE:

Business Mathematics with a completed or current grade of "C" or higher

YOU CAN EARN TAP CREDIT FOR THIS TCTC COURSE:

Mathematics for Business and Finance (MAT 164)

WHEN YOU COMPLETE THESE PROCEDURES:

1. Have a written recommendation from your high school/career center business mathematics teacher sent to the TCTC mathematics department head. (You must have senior standing.) This recommendation must document your course grade and contain a comparison of your skill levels to those required in the college course. (A copy of the syllabus and the textbook for TCTC's MAT 164 course have been provided to all area teachers of equivalent business mathematics courses who've requested the materials.)

2. Complete a TAP exam with a grade of "79%" or better. This essay (not multiple choice) examination will be developed, administered and scored by Tri-County Technical College mathematics faculty. Since the exam will be a calculator-dependent test, you must be prepared to bring your own calculator.

DEGREE/MAJOR: The following majors require MAT 164: ACC, CPT, MGT.

FOR MORE INFORMATION:

Contact Mr. Ray Collings, Mathematics Department Head, 646-8361, ext. 2314. (Toll-free numbers are listed on the front cover of this booklet.)

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OFFICE SYSTEMS TECHNOLOGY/SECRETARIAL SCIENCE

PROGRAM DESCRIPTION: As a student in Office Systems Technology/ Secretarial Science (OST), you would:

- study all aspects of the modern office including typing, word processing, and software packages for information management.
- receive comprehensive training in the specialized skills and knowledge of office procedures needed by the professional secretary working in a modern business environment.
- learn typing skills, computer skills, shorthand skills, and other advanced office competencies.

As an OST graduate, you would be well qualified for such entry-level positions as secretary, word processing operator and administrative or executive assistant, among others!

IF YOU'VE COMPLETED OR ARE NOW TAKING THESE HIGH SCHOOL COURSES:

Accounting I (see "a" below) AND/OR
Keyboarding (see "b" or "c" below) AND/OR
Keyboarding Applications or Advanced Keyboarding (see "c" below) AND/OR
Office Supervision and Management or Intensified Business Occupations (see "d" below) AND/OR
Shorthand I and/or Shorthand II (see "e" below) AND/OR courses containing machine transcription skills (see "f" below)

YOU CAN EARN TAP CREDIT FOR THESE TCTC COURSES:

a.	Secretarial Accounting	(OST/SSC 176)
b.	Keyboarding Skills I	(OST/SSC 143)*
c.	Typing I, II, III	(OST/SSC 152, 154, 159)
d.	Office Practice I	(OST/SSC 166)
e.	Shorthand I, II, III	(OST/SSC 161, 162, 163)
f.	Machine Transcription I, II	(OST/SSC 172, 173)

WHEN YOU COMPLETE THESE PROCEDURES:

1. For Typing, Keyboarding, Shorthand, and Office Practice courses, have a completed competency checklist from your high school business teacher sent to Ms. Brenda Rice, secretary, Business and Human Services Division. (You must have senior standing.)

For Secretarial Accounting and Machine Transcription courses, have the TAP recommendation form signed by your high school business teacher and sent to Mrs. Rice, Business/Human Services Division.

2. Pass a TAP exam in each area listed above. (NOTE: A TAP Exam is not required for keyboarding.)

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* Keyboarding I (OST/SSC 143) is not required in Office Systems Technology/Secretarial Science degree programs but is used as a required or approved elective course in several other TCTC majors.

(OVER)

TEXTILE MANAGEMENT TECHNOLOGY

PROGRAM DESCRIPTION: As a student in Textile Management Technology (TMT), you would:

- study basic operational principles of textile manufacturing and methods of managing personnel in textile industries.
- receive hands-on experience with machinery, calculations, fabric analysis, and fabric design.
- learn the principles of leadership, management, and logistics.
- spend time each week at area textile plants observing operations related to classwork.

As a TMT graduate, you would be well qualified for such entry-level positions as junior industrial engineer, shift supervisor, plant engineer, and manager trainee, among others!

IF YOU'VE COMPLETED OR ARE NOW TAKING THESE HIGH SCHOOL COURSES:

Textile Manufacturing I AND Textile Manufacturing II

YOU CAN EARN TAP CREDIT FOR THIS TCTC COURSE:

Introduction to Textiles (TEX 133)

WHEN YOU COMPLETE THESE PROCEDURES:

1. Have a written recommendation from your high school vocational teacher submitted to the TMT department head.

WHAT YOU WILL STUDY AT TCTC AFTER EARNING TAP CREDIT:*

FALL:
Communications I
Industrial Safety
Blueprint Reading and Sketching
Process Observation I
Industrial Safety

WINTER:
Yarn Manufacturing I
Communications II
Fabric Design
Process Observation II
Contemporary Mathematics

SPRING:
Textile Calculations
Motion and Time Study I
Process Observation III
Effective Speaking
Microcomputer Applications

* Assumes maximum credit earned for TCTC courses listed above.

(OVER)

WELDING

PROGRAM DESCRIPTION: As a student in Welding (WLD), you would:

- study the latest welding techniques and procedures to correctly weld different metals.
- receive hands-on experience with acetylene, arc, MIG and TIG welding, brazing, soldering, mechanical and manual cutting, and joint design preparation and layout.
- learn the principles and applications of resistance welding, inert gas dual-shielded welding, and carbon arc cutting.

As a WLD graduate, you would be well qualified for such entry-level positions as pipe welder, robotics welder technician, and maintenance welder, among others!

IF YOU'VE COMPLETED OR ARE NOW TAKING THESE HIGH SCHOOL COURSES:

Welding I AND Welding II
OR
Agricultural Mechanics I AND Agricultural Mechanics II

YOU CAN EARN TAP CREDIT FOR THESE TCTC COURSES:

Gas and Arc Welding Theory and Practice I	(WLD 113)
Blueprint Reading and Sketching	(EGT 102)
Arc Welding Theory and Practice I	(WLD 123)

WHEN YOU COMPLETE THESE PROCEDURES:

1. Have a written recommendation from your high school vocational teacher sent to the Welding department head.
2. Have a completed competency checklist sent to the Welding department head.
3. Place into Applied Math I (MAT 112) based on a satisfactory score on the TCTC placement test or successfully complete developmental mathematics.
4. Show satisfactory performance on a welding safety test and welding skills demonstration given by TCTC Welding Department.

(OVER)

ADVANCED PLACEMENT FOR ASSOCIATE DEGREE NURSING

Tri-County Technical College has a special advanced placement program for students who've successfully completed the Practical Nursing program at the Fred P. Hamilton Career Center and who've become licensed practical nurses (LPNs). This opportunity is somewhat different from the Technical Advanced Placement (TAP) program.

Students who complete Tri-County's ADN program are eligible to take the licensure exam to become a Registered Nurse (RN).

If you are currently enrolled in the Practical Nursing program at the Hamilton Career Center and are considering advanced placement for the ADN program at Tri-County Technical College, please contact the College admissions office and request a copy of the "Placement Policy for Licensed Practical Nurses."

It's very helpful to start planning early for admission to the Associate Degree Nursing program, particularly if you're interested in advanced placement. Because of the strong interest in the ADN program, there is usually a waiting list for admission.

If you have questions after reading the booklet entitled, "Placement Policy for Licensed Practical Nurses", please contact either Mrs. Timi Oglesby, ADN Counselor (646-8361, ext. 2193), or Mrs. Audra McPeak, ADN Department Head (646-8361, ext. 2252). The toll-free numbers for Tri-County Technical College are listed on the front cover of this booklet.

APPENDIX A

NAME [redacted]
STUDENT NUMBER [redacted]
BIRTH [redacted]

Tri-County Technical College
PENDLETON, SOUTH CAROLINA

COURSE NUMBER	COURSE TITLE	GRADE	CREDIT HOURS	QUALITY POINTS	COURSE NUMBER	COURSE TITLE	GRADE	CREDIT HOURS	QUALITY POINTS

Tech Ed Academic Record

Secondary Schools:
D.W. DANIEL HIGH SCHOOL 09/85 - 06/89

Program:
BUSINESS & HUMAN SERVICES
ASSOCIATE IN BUSINESS
Major: SECRETARIAL SCIENCE

Exempt Credit Applied to FALL 1989
TECHNICAL ADVANCED PLACEMENT

TYPING I	4.5
TYPING II	4.5
Transfer/Exempt Credit Total	9.0

---------- FALL 1989 ----------

Admitted Program:
BUSINESS & HUMAN SERVICES
ASSOCIATE IN BUSINESS
Major: SECRETARIAL SCIENCE

COURSE NUMBER	COURSE TITLE	GRADE	CREDIT HOURS	QUALITY POINTS
SSC -161	SHORTHAND I	A	4.5	18.0
SSC -113	PERSONAL DEVELOPMENT	A	3.0	12.0
SSC -159	TYPING III	B	4.5	13.5
SSC -198	DATA ENTRY MACHINES	B	4.5	13.5

	AHRS	EHRS	QHRS	QPTS	GPA
Current	16.5	16.5	16.5	57.0	3.455
Cumulative	16.5	25.5	16.5	57.0	3.455

** End of Tech Ed Record **

KEY
- R REPEATING COURSE
- * COURSE NOT APPLIED TO CURRENT PROGRAM
- ** INCLUDES INITIAL STATISTICS

Lorraine C. Frith
OFFICIAL SIGNATURE

Federal law prohibits access to this record by any party without written consent of the student.

[redacted]

PAGE 1 OF

12/05/8
Officia
Academic R

Official transcripts bear signature stamp embossed with university seal.

APPENDIX B

TRI-COUNTY TECHNICAL COLLEGE COURSES AVAILABLE FOR TAP CREDIT

COURSE NAME	TAP PROCEDURE PAGE
Arts and Sciences	
Communications I (ENG 126)	19
Math for Business and Finance (MAT 164)	31
Business Technologies	
Fashion Merchandising I (FSM 201)	22
Introduction to Computers (CPT 101)	14
Keyboarding Skills I (OST/SSC 143)	32
Machine Transcription I (OST/SSC 172)	32
Machine Transcription II (OST/SSC 173)	32
Microcomputer Applications I (CPT 170)	13
Office Practice I (OST/SSC 166)	32
Principles of Accounting I (ACC 101)	11
Principles of Accounting II (ACC 102)	11
Secretarial Accounting (OST/SSC 176)	32
Shorthand I (OST/SSC 161)	32
Shorthand II (OST/SSC 162)	32
Shorthand III (OST/SSC 163)	32
Twentieth Century Fashion (FSM 230)	22
Typing I (OST/SSC 152)	32
Typing II (OST/SSC 154)	32
Typing III (OST/SSC 159)	32
Engineering Technologies	
AC Circuits (EET 125)	15
Active Devices (EET 131)	15
DC Circuits (EET 115)	15
Engineering Graphics I (EGT 111)	17
Engineering Graphics II (EGT 121)	17
Health Technologies*	
Anatomy and Physiology I (ANA 131)	38
Anatomy and Physiology II (ANA 141)	38
Nursing Process I (NUR 152)	38
Nursing Process II (NUR 162)	38
Nursing Process III (NUR 182)	38
Industrial Technologies	
Air Conditioning I (ACR 136)	23
Arc Welding Theory and Practice I (WLD 123)	36
Automatic Controls I (ACR 137)	23
Basic Electricity (ACR 116)	23
Blueprint Reading and Sketching (EGT 102)	36

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* Credit for these courses is available through a special advanced placement program with Tri-County Technical College's Nursing Education Division.

APPENDIX C

GLOSSARY

ADVANCED PLACEMENT	Occurs when a student is allowed to skip over a course, or enter on a higher level, than is normally required upon entering a college program.
AP	An abbreviation for "Advanced Placement", usually used when referring to the College Board's AP program accepted by most two and four year colleges throughout the country. Technical Advanced Placement (TAP) functions like a local version of AP for occupational degree programs at Tri-County Technical College.
ASSOCIATE DEGREE	A degree awarded by a two-year community, junior or technical college indicating that the graduate has completed a program of study with a broad base in general education and a concentration in a specific area. The degree may be in an occupational area (such as Electronics) or in liberal arts (such as an associate degree in science or arts.) Occupational associate degrees are now preferred by many employers and the liberal arts associate degree is widely accepted for transfer into a bachelor's degree program.
EXEMPTION CREDIT	Credit awarded for a college course which exempts or "releases" the student from taking the course on the college campus. Exemption credit appears on the student's transcript, is calculated into the total earned credit hours but does not affect the grade point average (GPA).
MID-LEVEL TECHNOLOGY CAREERS	Careers requiring one or two years of postsecondary education for entry and/or advancement. These careers are in many different fields, offer good salaries and opportunities for advancement and are growing rapidly through South Carolina and the nation.
OCCUPATIONAL DEGREE PROGRAM	A program at a two-year college designed to prepare students to enter the workforce immediately following graduation. While some occupational degree courses and/or programs transfer to four-year colleges, their primary function is career preparation.

APPENDIX D

PROGRAM ABBREVIATIONS

OCCUPATIONAL DEGREE PROGRAMS

Engineering Technologies

(AMT)	Automated Manufacturing Technology
(EET)	Electronics Engineering Technology
(EGT)	Engineering Graphics Technology
(QAT)	Quality Assurance Technology

Industrial Technologies

(GT)	General Technology (majors: Industrial Mechanics, Welding)
(HVAC)	Heating, Ventilation, Air Conditioning Technology
(IET)	Industrial Electronics Technology
(IM)	Industrial Mechanics*
(MTT)	Machine Tool Technology
(TMT)	Textile Management Technology
(WLD)	Welding*

Business Technologies

(ACC)	Accounting
(CPT)	Computer Technology (Data Processing and Computer Programming emphases)
(FSM)	Fashion Merchandising*
(MGT)	Management (General, Marketing, and Financial Management emphases).
(RTV)	Radio and Television Broadcasting
(OST)	Office Systems Technology/Secretarial Science

Public Service Technologies

(CDA)	Child Development Assistant*
(CRJ)	Criminal Justice Technology

Health Technologies

(DTA)	Dental Assisting*
(MLT)	Medical Laboratory Technology
(ADN)	Nursing (Associate Degree/Registered Nurse)
(PN)	Practical Nursing (LPN)*
(SRT)	Surgical Technology*
(VET)	Veterinary Technology

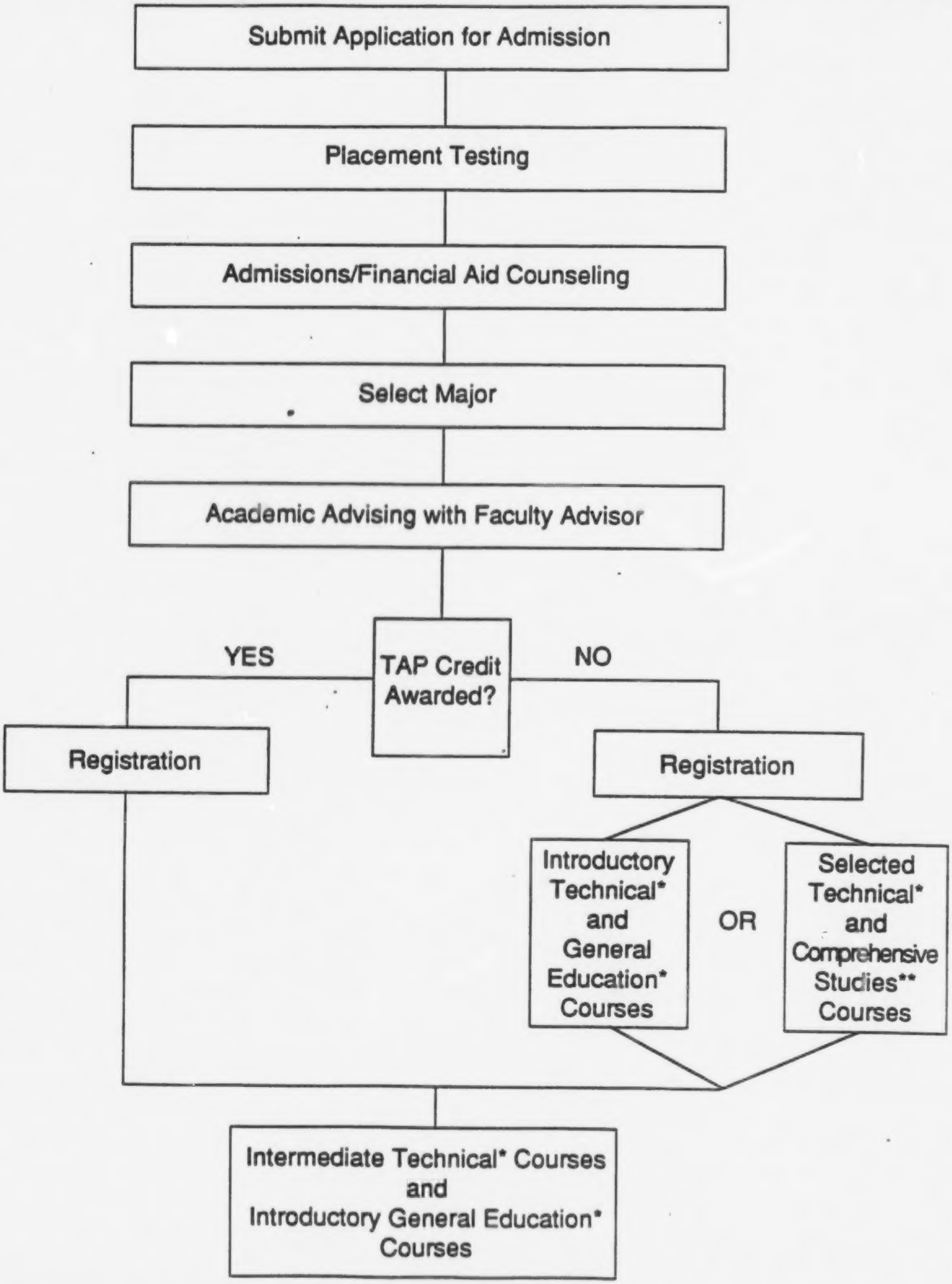
UNIVERSITY TRANSFER PROGRAMS

(AA)	Associate in Arts
(AS)	Associate in Science

* Indicates one-year certificate or diploma programs. (Secretarial Science/Office Systems Technology also offers diploma and certificate options.) All other programs on this list are associate degree programs. (Tri-County Technical College also offers a number of short-term certificate programs for job training that are not included on this list--contact the College admissions office for more information on certificate programs.)

APPENDIX E

Becoming a Student at Tri-County Technical College


Submit Application for Admission
Placement Testing
Admissions/Financial Aid Counseling
Select Major
Academic Advising with Faculty Advisor
TAP Credit Awarded?
YES
NO
Registration
Registration
Introductory Technical* and General Education* Courses
OR
Selected Technical* and Comprehensive Studies** Courses
Intermediate Technical* Courses and Introductory General Education* Courses

* Technical courses are courses in the major or program area; general education courses are in academic areas such as math, English, science, etc.

** Developmental courses in math, English and reading for improvement of basic skills, recommended on the basis of placement test results.

Earn College Credit in High School

—with—

Technical Advanced Placement

IS TAP LIKE "AP" CREDIT?

TAP is an advanced placement opportunity for students who plan to graduate from one of Tri-County Technical College's degree programs. Students who've participated in the College Board's AP program can also earn credit for specific Tri-County courses if they've earned a score of 3 or higher on the appropriate AP exam.

Tri-County Technical College
P. O. Box 587
Pendleton, SC 29670

BEST COPY AVAILABLE

Earn College Credit in High School

—with—

Technical Advanced Placement

Tri-County Technical College
P. O. Box 587
Pendleton, SC 29670
(646-8361)

Toll-Free Numbers:
Anderson County 225-2250
Oconee County 882-4412
Pickens County 859-7033

You can earn college credit through TAP for these Tri-County Technical College courses:

Business Technologies
- Fashion Merchandising I
- Introduction to Computers
- Keyboarding Skills I
- Machine Transcription I and II
- Microcomputer Applications I
- Office Practice I
- Principles of Accounting I and II
- Secretarial Accounting
- Shorthand I, II and III
- Twentieth Century Fashion
- Typing I, II and III

Engineering Technologies
- AC Circuits
- Active Devices
- DC Circuits
- Engineering Graphics I and II

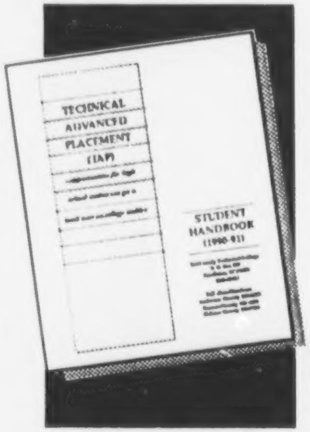
Industrial Technologies
- Air Conditioning I
- Arc Welding Theory and Practice
- Automatic Controls I
- Basic Electricity
- Blueprint Reading and Sketching
- Electricity/DC
- Electricity/AC
- Electronics and Applied Circuits
- Fundamentals of Refrigeration
- Gas and Arc Welding Theory and Practice I
- Heating Fundamentals
- Introduction to Textiles
- Toolroom Machining I, II, III and IV

Arts and Sciences
- Communications I
- Math for Business and Finance

YOU CAN GET A HEAD START ON COLLEGE STUDIES

Technical Advanced Placement (TAP) enables you to earn Tri-County Technical College credit based on completion of certain high school courses and specific TAP procedures. This opportunity is made possible through special agreements between the school districts of Anderson, Oconee and Pickens counties and Tri-County Technical College.

TAP can save you time, money and/or enable you to carry lighter course loads in your first terms at Tri-County. And, it doesn't cost you anything to participate!


TECHNICAL ADVANCED PLACEMENT (TAP)
STUDENT HANDBOOK (1990-91)

HOW DOES TAP WORK?

All you have to do is follow the steps outlined in the Student TAP Handbook which is available from your counselor, teacher or by calling the Tri-County Technical College Admission office (the numbers are listed on the front of this brochure, ask for extension 2200 when you call).

You have to be a senior to participate, but you can start planning as early as grade 9, so look for a copy of the student handbook right away and start preparing for your college studies!

When you earn TAP credit and enroll at Tri-County, your college transcript will show the credit you've earned. You can use TAP credit for required courses or as approved electives in associate degree programs.

BEST COPY AVAILABLE

TEACHING PATH - CLASS L3

(Students should have read this lab before proceeding, mostly to familiarize them with the nature of the lab to be completed and the equipment to be used.)

RESOURCE MATERIALS

Lab 1M3: "Mechanical Bending Stress"

CLASS GOALS

See OBJECTIVES for Lab 1M3.

CLASS ACTIVITIES

(Set up the lab. Run through the Procedures before the students try the lab. You'll be able to anticipate student difficulties.

1. Preview the lab for the students. Explain what the lab is about.Show students the equipment.Tell students what they are to accomplish.
2. Have the students follow the Procedures outlined in the lab instructions. Encourage students to read the Procedures carefully. (Reading detailed procedures and following instructions are important parts of a technician's training.)
3. Monitor student progress. Provide help as needed.
4. Before coming to the next class, you should review print/ video material on "Force in Mechanical Systems." Ask students to review the Objectives and Main Ideas in preparation for Class R, a review of the subunit, "Force in Mechanical Systems."

NOTE: Before class cut strips of the materials which your students will use in the bending tests. These strips should be 30 cm long X 2 cm wide X 2 mm thick with a hole to insert the weight hanger at one end. Also, cut strips of wood 10 cm long X 3 cm wide X 1 cm thick to help clamp the bending test strips to a table.

LAB OBJECTIVE

When you've finished this lab, you should be able to do the following:

1. Measure the deflection of a beam subjected to bending stress.
2. Calculate the resistance of a beam to bending stress.

LEARNING PATH

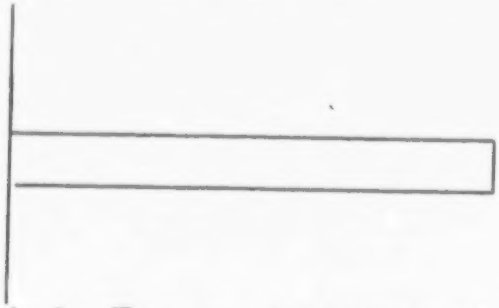
1. Preview the lab. This will give you an idea of what's ahead.
2. Read the lab. Give particular attention to the Lab Objectives.
3. Do lab, "Mechanical Bending Stress."

MAIN IDEA

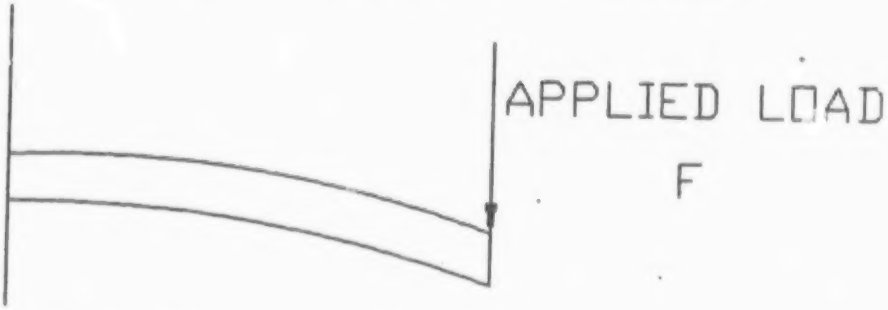
- A beam which is loaded by a force placed at some distance from its restrained end will deflect or bend.
- The degree of beam deflection depends on the magnitude of load applied, the material from which the beam is constructed and the distance between the load and the restrained end of the beam.

DISCUSSION

If we load a beam at a distance from its restrained (or supported) end, the beam will deflect (or bend). The bending of loaded beam is shown in Figure 1 below.



(a) Beam Without a Load



(b) Beam with a Load

Figure 1 Beam without a Load and after Loading.

The load placed on the beam has caused a mechanical stress in the beam material. This mechanical stress causes a tension stress in the top of the beam and a compression stress in the lower part of the beam. Some where between the top and bottom sides of the beam (as the stress changes from tension to compression) the stress is zero. This plane of zero beam stress is called the neutral surface. The stress profile in Figure 2 below illustrates the idea of the neutral surface.

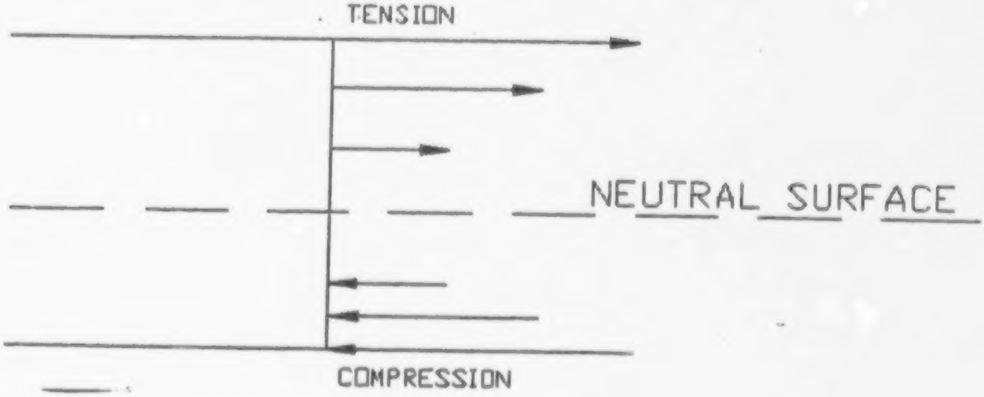

TENSION
NEUTRAL SURFACE
COMPRESSION

Figure 2 Stress Profile in a Loaded Beam

Figure 3 below illustrates the parameters of a beam cross section which are use to calculate the stresses an deflection of the beam.

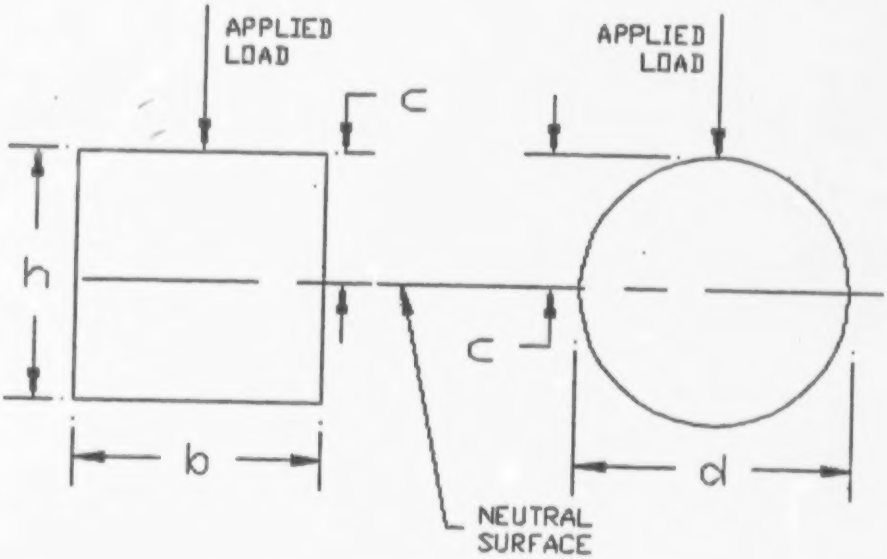

APPLIED LOAD
c
h
b
APPLIED LOAD
c
d
NEUTRAL SURFACE

Figure 3 Beam Stress and Deflection Parameters

MOMENT OF INERTIA OF BEAMS
The ability of a beam to resist bending stresses depends on the type of material from which the beam is constructed and the distribution of the material in the beam in relationship to the direction of the load.

The distribution of the beam material in relation to the direction of the load is quantified as the Moment of Inertia of the beam about the neutral surface.

Some formulae for moments of inertia of beams are:

Rectangular Beam Cross Sections

$$I = \frac{b * h^{3}}{12} \tag{1}$$

where I = Moment of Inertia about the neutral surface
b = width of beam (perpendicular to load)
h = depth of beam (parallel to load)

Round Beam Cross Sections

$$I = \frac{PI * d^{4}}{64} \tag{2}$$

where PI = pi or 3.141592654...

BENDING STRESS IN BEAMS

The bending stress in a beam is produced by loading the beam at a distance from its restrained (or supported) end. Figure 4 below illustrates a cantilever beam loading.

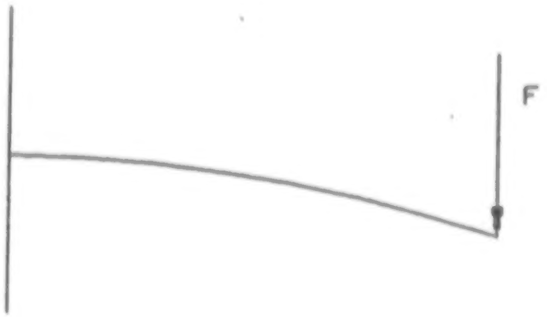


Figure 4 Cantilever Beam Loading

In the cantilever beam the effect of the loading force is to produce a moment. The moment of the cantilever beam shown in Figure 4 is:

$$M = F * L \tag{3}$$

where M = the moment on the beam
F = the force on the beam
L = the distance from the beam support to the load force PERPENDICULAR to the load force

The stress in a beam can be calculated from:

$$S = \frac{M * v}{I} \qquad 4$$

where S = stress in the beam at a distance of v from the neutral surface
v = distance from the neutral to the point at which the stress is calculated (let's call x "POSITIVE" if it is ABOVE the neutral surface and "NEGATIVE" if it is BELOW the neutral surface)
I = the Moment of Inertia of the beam

If the distance form the neutral surface at which we calculate the stress is c (the distance from the neutral surface to the outside surface of the beam) then we calculate the maximum stress in the beam (tension if S is + and compression if S is -) or:

$$S_{max} = \frac{M * c}{I} \qquad 5$$

DEFLECTION IN BEAMS

When a beam is loaded in cantilevered fashion, the free end of the beam will be deflected or bent downward as shown in Figure 5 below:

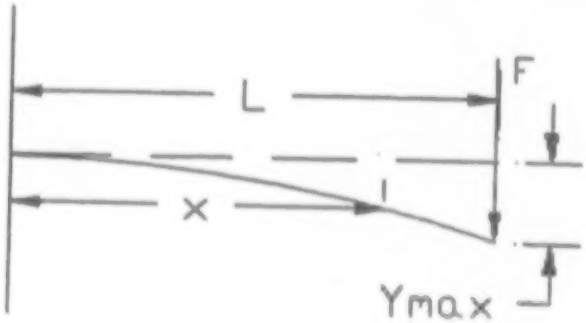


Figure 5 Deflection of a Cantilevered Beam

The value of the beam deflection can be calculated from the equation:

$$y = \frac{M * x^2}{2 E * I} \qquad 6$$

where y = the beam deflection

M = the moment on the beam

x = the distance from the supported end of the beam to the point at which the deflection is being calculated

E = the modulus of elasticity of the material from which the beam is constructed

I = the Moment of Inertia of the beam

If the distance from the supported end of the beam is equal to the distance from the supported end of the beam to the load force, then the deflection will be its maximum value. This maximum value of deflection can be calculated from the equation:

$$y_{max} = \frac{M * L^2}{2 E * I} \qquad 7$$

STIFFNESS OF BEAMS

The ability of a beam to resist bending is called stiffness. The stiffness of a beam is determined by calculating the spring constant of the beam from:

$$k = \frac{F}{y} = \frac{\text{applied load}}{\text{deflection}} \qquad 8$$

Substituting M from Equation 3 above into Equation 7 and solving for F/y we obtain the equation for beam spring constant as:

$$k = \frac{2 E * I}{L^2} \qquad 9$$

The higher the value of k the greater the load force needed to produce the same value of beam deflection thus the beam is more resistant to bending or it is stiffer.

DATA TABLE 1

L = cm.
Z_o = cm.
W_o = kg.

Test	Z	Z_o	$Y_{max}=Z-Z_o$	W	W_o	$F=W-W_o$
1						
2						
3						
4						

WRAP-UP

From the weight and deflection data in Data Table 1 calculate the spring constant of the beam and enter the value in Data Table 2. This the variable k.

DATA TABLE 2

Test	F	Y_{max}	$K = F/Y_{max}$
1			
2			
3			
4			

ADDITIONAL EXERCISES

From the dimensions of the beams tested, calculate the Moment of Inertia, I, and calculate the Modulus of Elasticity, E, of the beam material from:

$$E = \frac{k * L^3}{2\ I}$$

Record these calculated values of E in Data Table 3.

DATA TABLE 3

Test	k	L	I	$E=k*L^3/(2I)$
1				
2				
3				
4				

Is the Modulus of Elasticity related to the stiffness of the beam?

EQUIPMENT

Ruler (centimeters)
Meter stick
Weights (1/2 kg., 1 kg., 2 kg.)
Weight hanger, 1 kg. type
Deep-throat C-clamp
Wood strip (approximately 10 cm long X 3 cm wide X 1 cm thick
Strips of material (approximately 30 cm long X 2 cm wide X 2 mm thick) (various metals and plastics should be used)

PROCEDURES

1. Secure a strip of material to the edge of a table using the C-clamp and wood strip, allowing 20 cm of the strip to hang over the edge of the table. [CAUTION!!! Be careful not to put your feet under the test sample or weight hanger at any time. If the C-clamp slips there could be some serious injuries.

2. Measure and record in Data Table 1 the distance from the edge of the wood strip to the center of the weight hanger hole. This is the variable L.

3. Measure and record in Data Table 1 the distance from the floor to the test sample (at the weight hanger). This is the distance Z_o.

4. Measure and record the weight hanger weight in Data Table 1. This is the variable W_o.

5. Attach the weight hanger to the test specimen, measure and record in Data Table 1 the distance from the floor to the test sample (at the weight hanger). This is the variable Z.

6. Then calculate the deflection by subtracting the loaded distance from the unloaded distance and record in Data Table 1. This is the variable y_{max}.

7. Repeat Step 5 using the 1/2 kg., 1 kg and 2 kg. weights. Record the weights and deflections in Data Table 1.[CAUTION!!! DO NOT forget to add the weight of the hanger to that of the attached weights.] This is the Variable $F = W + W_o$.

8. If you wish to test various samples of materials, make copies of Data Table 1 and repeat Steps 1 through 6 for each of the samples.

TEACHING PATH - CLASS L3

RESOURCE MATERIALS

Lab 3T3: "Measuring Heat flow Using an Electrical Analog"

CLASS GOALS

See OBJECTIVES for Lab 3T3

CLASS ACTIVITIES

(Set up the lab. Run through the Procedures before the students try the lab. You'll be able to anticipate student difficulties.

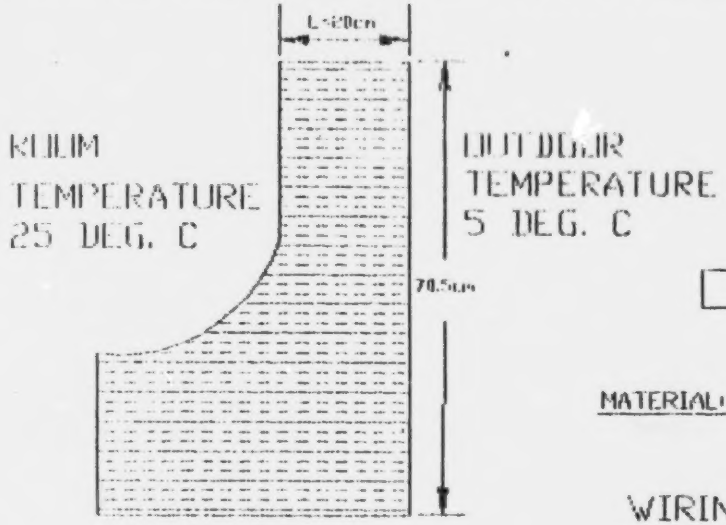
1. Preview the lab for the students. Explain what the lab is about.Show students the equipment.Tell students what they are to accomplish.
2. Have the students follow the Procedures outlined in the lab instructions. Encourage students to read the Procedures carefully. (Reading detailed procedures and following instructions are important parts of a technician's training.)
3. Monitor student progress. Provide help as needed.

NOTE: The Test Block can be built using the attached drawing "Corner Block Drawing". Students in the school's shop classes can make the Test Block using aviation snips. HINT: make photocopies of the "Test Block Pattern" and the "Wiring Clamp Pattern" and use these copies for a pattern by which to cut the sheet metal. CAUTION: When working with sheet metal be careful not to be cut by the sharp edges. NOTE: The Wire Clamps must be in intimate contact with the Test Block to insure that the voltage is applied uniformly along the "walls" of the Test Block in order to accurately simulate the temperature difference across a wall.

To further study the effect of geometry on heat flow rate, cut out different Test Blocks and Wiring Clamps to simulate different Corner Block shapes. You are only limited by your own imagination when simulating heat flow using the electrical analog.

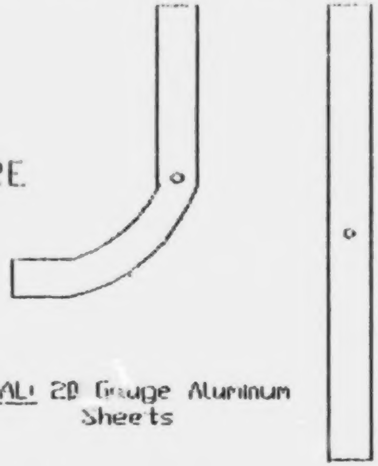
By measuring the voltage between any point on the Test Block and power supply ground (-) you may determine the "temperature" at that by using the temperature versus voltage scale factor. By placing a grid on the Test Block and measuring the voltages at the grid intersections a temperature profile may be obtained for the Corner Block. Engineers use such temperature profiles to help to reduce the heat lost from buildings or to study the heat flow through newly designed machines without having to actually build the machine.

CAUTION: Observe all safety procedures used when working with electrical devices.


L=20cm
ROOM
TEMPERATURE
25 DEG. C
OUTDOOR
TEMPERATURE
5 DEG. C
70.5cm

WALL MATERIAL
k= 0.125 cal/sec-cm-cm-C/cm

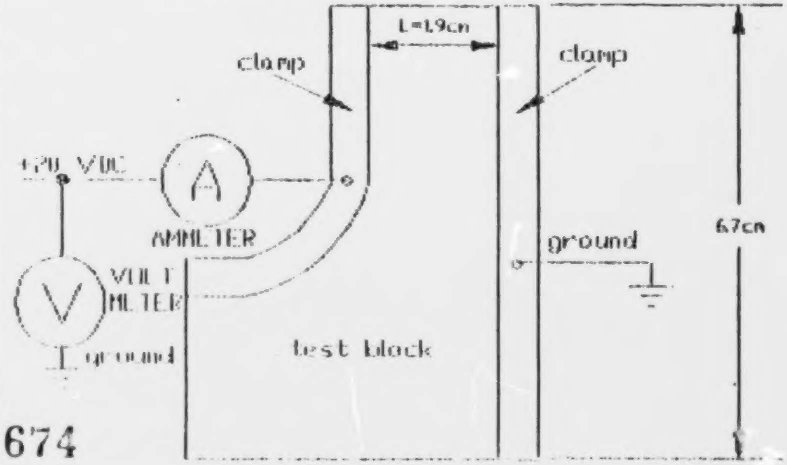
ROOM CORNER BLOCK



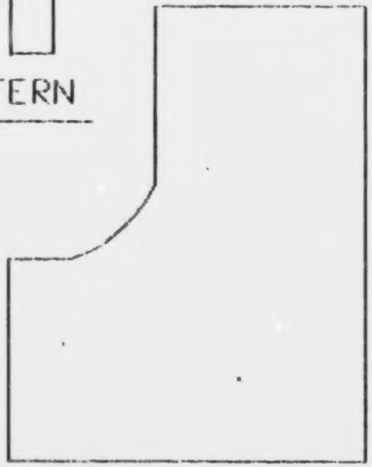
MATERIAL: 20 Gauge Aluminum Sheets

WIRING CLAMP PATTERN

NOTE:
1. Clamp wire clamps securely and uniformly to the test block
2. Solder power supply wires to clamps at 1/32 inch drilled holes


clamp
L=1.9cm
clamp
+20 VDC
A
AMMETER
VOLT METER
V
ground
ground
6.7cm
test block

TEST SET UP



MATERIAL: 20 Gauge Aluminum Sheets

TEST BLOCK PATTERN

CORNER BLOCK DRAWING

drawn: J.T. Brown | date: 1/16/90 | scale: FULL

MEASURING HEAT FLOW USING AN ELECTRICAL ANALOG

Lab 3T3

LAB OBJECTIVE

When you've finished this lab, you should be able to analyze the heat flow through any material composition or geometry using the analogy between heat conduction through a thermal resistance and electrical current flow through an electrical resistance.

LEARNING PATH

1.Preview the lab. This will give you an idea of what's ahead.
2.Read the lab.Give particular attention to the Lab Objectives.
3.Do lab, "Measuring Heat Flow Using an Electrical Analog"

MAIN IDEA

.Analogues allow tests to be performed on test devices in manner much less tedious than if the test were performed on an actual device.

DISCUSSION

ANALOGUES are dissimilar things which correspond in some way to each other. In plain English, analogues are physically different but operate in a similar manner.

WHAT IS AN ELECTRICAL ANALOG FOR HEAT FLOW?

Scientists and engineers have developed certain "Laws" to mathematically describe or predict the operation of physical systems. These "Laws" are expressed as formulae or equations.

The "Law" which describes heat flow by conduction across an object (such as is shown in Figure 1) is:

$$Q = \frac{kA(T_2 - T_1)}{L}$$

where Q = heat flow rate (thermal rate)
k = thermal conductivity of the object through which the heat is "flowing"
A = surface area of the object (at right angles to the direction of heat flow
L = thickness of the object (in the direction of heat flow
T_2 = temperature on the "hot" side of the object
T_1 = temperature on the "cold" side of the object

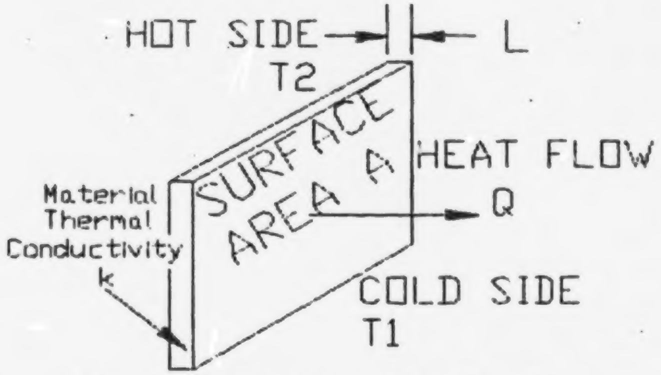


Fig. 1 Conduction Heat Flow

The "Law" which describes the flow of electrical current through an object (such as shown in Figure 2) is:

$$I = \frac{V}{R}$$

where I = current (flow of charge)
V = voltage drop across the object
R = electrical resistance of the object

This equation is known as Ohm's Law.

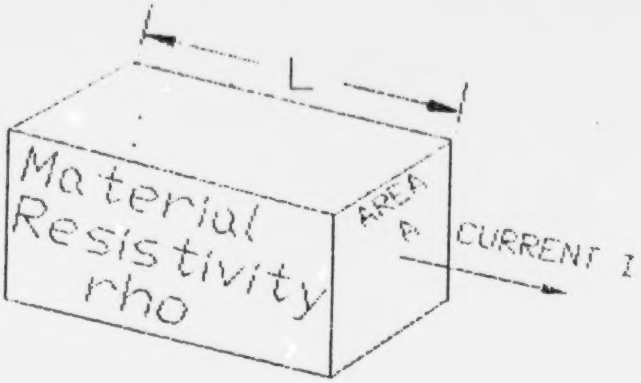


Fig. 2 Electrical Current Flow

Thus, by looking at the similarities between the heat flow equation and Ohm's Law,we can determine the analog quantities as shown in Table 2.

Type of Quantity	Ohm's Law	Heat Flow Equation
Rate	I	Q
Driving Force	V	$T_2 - T_1$
Resistance	R	L/kA

In fact, almost any rate "Law" can be expressed as:

$$\text{Rate} = \frac{\text{Driving Force}}{\text{Resistance}}$$

ELECTRICAL ANALOG SIMULATION OF HEAT FLOW IN IRREGULAR GEOMETRIES

In objects which have regular geometries (i.e., can be easily expressed mathematically), the heat flow equation can be used to calculate the heat flow rate using simple calculations.

However, in objects whose geometries are irregular (not easy to express mathematically) calculations require computers or simplifying assumptions (which greatly reduce the accuracy of the results. Another way of determining the heat flow would be to build an EXACT model of the object and subject it to the conditions it would see in its actual operation. The latter method is very expensive and quite time consuming especially if the service conditions vary and/or several designs must be analyzed.

By using the analogies between electrical current flow and heat flow, heat flow rate in an actual object can be determined by using scale factors on the measured value of electrical current flowing in an electrically conducting test object.

SCALE FACTORS FOR THE ELECTRICAL ANALOG OF HEAT FLOW

Scale factor for the electrical analog of heat flow can be comparing the analogous parts of the heat flow equation and Ohm's Law (i.e., RATE, DRIVING FORCE, RESISTANCE). Since we will be measuring ELECTRICAL properties and calculating HEAT FLOW, let's use a scale factor "format" like:

$$\text{Heat Flow Quantity} = \text{Scale Factor} \times \text{Electrical Quantity}$$

-then-

$$Q = K_I \times I$$

$$T_2 - T_1 = K_V \times V$$

$$\frac{L}{kA} = K_R \times R$$

Now let's write the equations for the scale factors for RATE ,K_I, RESISTANCE, K_V, and DRIVING FORCE, K_R:

$$\text{Scale Factor} = \frac{\text{Heat Flow Quantity}}{\text{Electrical Quantity}}$$

-then-

$$K_V = \frac{T_2 - T_1}{V}$$

-and-

$$K_R = \frac{L_G/kA_G}{R}$$

but remember the equation for resistance of a conductor is:

$$R = \frac{\text{rho} \times L_R}{A_R}$$

where
rho= resistivity of the object
L_R = thickness of object (in direction of current)
A_R = cross-sectional area of object (perpendicular to direction of current)

By substituting for R in the equation for K_R and rearranging we have:

$$K_R = \frac{A_R L_G}{A_G L_R k(\text{rho})}$$

-and-

$$K_I = \frac{Q}{I}$$

Since $Q = k \times A_Q(T_2 - T_1)/L_Q$ and $I = V/R$ (or $V \times A_R/(\text{rho} \times L_R)$, substituting these values into the K_I equation and rearranging we have:

$$K_I = \frac{k \times A_Q(T_2 - T_1)}{L_Q} \times \frac{\text{rho} \times L_R}{V \times A_R}$$

-or-

$$K_I = \frac{A_Q L_R k(\text{rho})}{A_R L_Q} \times \frac{(T_2 - T_1)}{V}$$

-THUS-

$$K_I = \frac{K_V}{K_R}$$

Then using these scale factors and the analog equations, we can determine the heat flow rate of an object by measuring the current through a test object.

SUMMARY OF ELECTRICAL ANALOG OF HEAT FLOW EQUATIONS

Let's arrange these equations in a simple fashion in the order in which they will be used to determine the heat flow in an object by measuring the current in our test object.

SCALE FACTOR EQUATIONS

$$K_R = \frac{A_R L_Q}{A_Q L_R k(\text{rho})}$$

$$K_V = \frac{T_2 - T_1}{V}$$

$$K_I = \frac{K_V}{K_R}$$

ANALOG EQUATIONS

$$Q = K_I I$$

VARIABLES NEEDED TO USE THE ANALOG METHOD OF TESTING

A_R = length of straight side X thickness of TEST object
A_Q = length of straight side X thickness of ACTUAL object
L_Q = length of short side of ACTUAL object (perpendicular to A_Q)
L_R = length of short side of TEST object (perpendicular to A_R)
k = thermal conductivity of ACTUAL object
rho = resistivity of TEST object
T_2 = "hot side" temperature of ACTUAL object
T_1 = "cold side" temperature of ACTUAL object
V = voltage drop across TEST object

VALUES MEASURED FROM THE ELECTRICAL TEST OBJECT

I = current through the test object

VALUES CALCULATED FOR THE ACTUAL OBJECT

Q = heat flow through the object

MEASURING THE HEAT LOSS FROM A ROOM CORNER BLOCK

In order to make the Electrical Analog of Heat Flow useful, let's apply the technique to measuring the heat flow from part of a building wall. Figure 3 below shows the Actual Object to be tested:

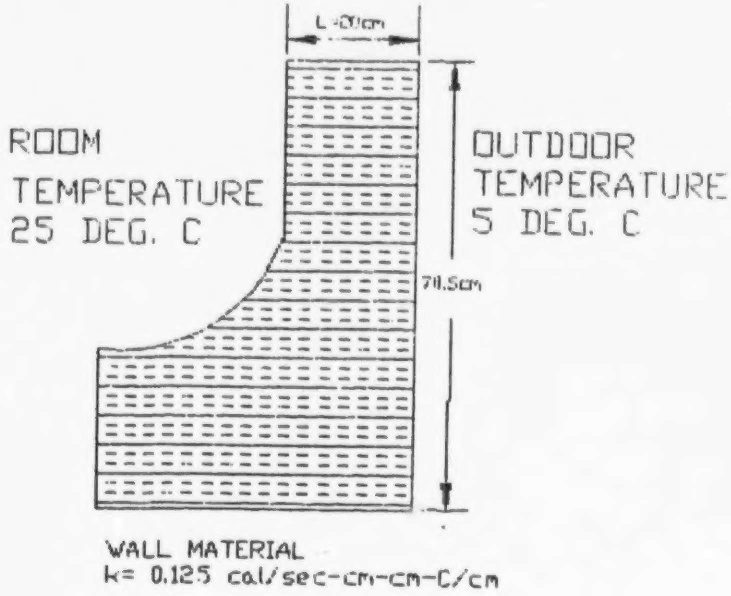

L=20cm
ROOM
TEMPERATURE
25 DEG. C
OUTDOOR
TEMPERATURE
5 DEG. C
71.5cm
WALL MATERIAL
k= 0.125 cal/sec-cm-cm-C/cm

Fig. 3 Room Corner Block

In Figure 3 we have shown a top view of the corner of a room in the building for which we will be measuring heat loss. In order to perform the test, we first must calculate the Scale Factors for the Electrical Analog of Heat Flow (we will assume the outdoor face of the Corner Block is 250 cm "thick"and that there is no heat loss from the two(2) faces perpendicular to the outdoor faces, the top of the corner or the bottom of the corner). Figure 4 below shows the Test Block we will use to simulate the Actual Block in the corner of the room:

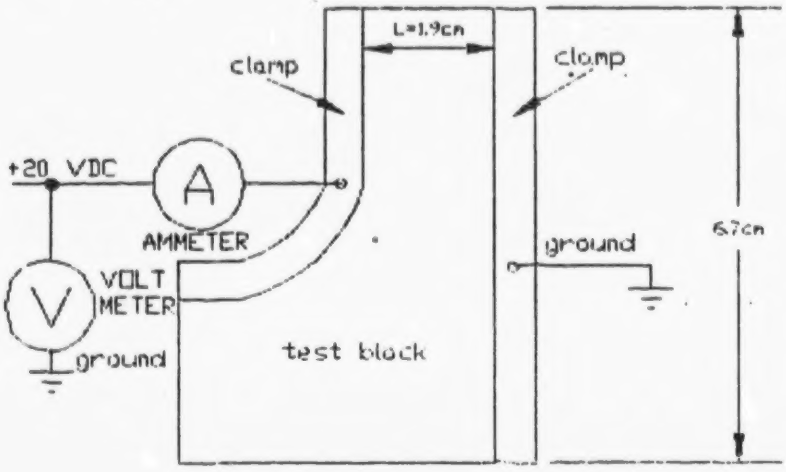

L=1.9cm
clamp
clamp
+20 VDC
A
AMMETER
V
VOLT
METER
ground
ground
6.7cm
test block

Fig. 4 Test Block

VARIABLES NEEDED TO USE THE ANALOG METHOD OF TESTING

A_R = 6.7 cm X 0.0934 cm^* = 0.626 cm^2
A_B = 70.5 cm X 250 cm = 17,625 cm^2
L_B = 20 cm
L_R = 1.9 cm
k = 2.17 watts/cm-deg C^*
rho= 2.688 X 10^{-6} $ohm-cm^*$
T_2 = 25 deg C
T_1 = 5 deg C
V = 20 volts
* Values from Handbook of Engineering Fundamentals
John Wiley and Sons, Inc. publisher

SCALE FACTOR EQUATIONS

$$K_R = \frac{(6.7\ cm^2)(20\ cm)}{(70.5\ cm^2)(1.9\ cm)(2.17\ watts/cm\text{-}deg\ C)(2.668 \times 10^{-6}\ ohm\text{-}cm)}$$

K_R = 1.715 X 10^5 deg C/watt-ohm

$$K_V = \frac{(25\ deg\ C - 5\ deg\ C)}{20\ volts} = 1\ deg\ C/volt$$

$$K_I = \frac{1\ deg\ C/volt}{1.715 \times 10^5\ deg\ C/watt\text{-}ohm} = 5.831 \times 10^{-6}\ watt\text{-}ohm/volt$$

NOTE: 1 amp = 1 volt/ohm

-or-

K_I = 5.831 X 10^{-6} watt/amp

ANALOG EQUATIONS

Q(watt) = (5.831 X 10^{-6} watt/amp)I(amp)

-or using milliamps(ma)

$$\boxed{Q(watt) = (5.831 \times 10^{-3}\ watt/ma)I(ma)}$$

ANALOG EQUATION TO USE IN LAB

CONCLUSIONS

Thus,by measuring the current, I, flow through the Test Block, we can calculate the heat flow, Q, through the Corner (Actual) Block.

By changing the variables and Test Block geometry, we can recalculate the analog equation and test any other heat flow we wish.

Laboratory

EQUIPMENT

- DC Power Supply
- Voltmeter or DMM
- Ammeter or VOM
- Test Block with Wire Clamps

PROCEDURES

1. Hook the power supply to the Test Block as shown in Figure 1 below:

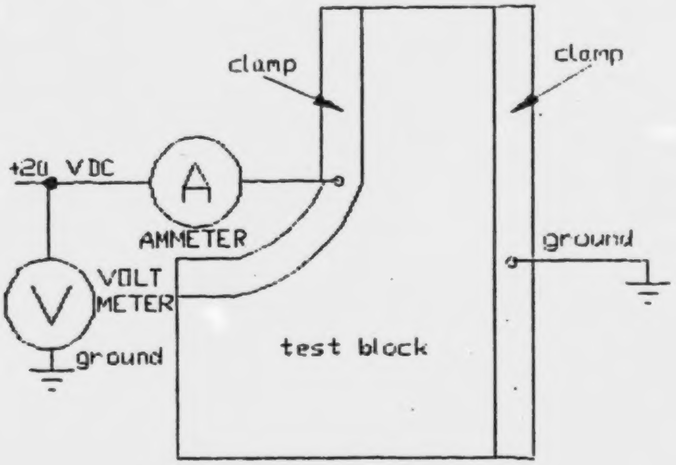


Fig. 1

2. Adjust the voltage across the Test Block to 20 volts DC.(This simulates a 20 degree C temperature difference between the outside and inside walls of the Corner Block)
3. Measure the current through the Test Block and record the value below in Data Table 1:

NOTE: You may want to simulate other temperature differences across the Corner Block, if so, record the current through the test block for the other voltage drops shown in Data Table 1. REMEMBER: If you change the voltage drop you MUST recalculate K_V and K_I.

VARIABLES NEEDED TO USE THE ANALOG METHOD OF TESTING

A_R = 6.7 cm X 0.0934 cm* = 0.626 cm^2
A_G = 70.5 cm X 250 cm = 17,625 cm^2
L_G = 20 cm
L_R = 1.9 cm
k = 2.17 watts/cm-deg C*
rho= 2.688 X 10^{-6} ohm-cm*
T_2 = 25 deg C
T_1 = 5 deg C
V = 20 volts
* Values from Handbook of Engineering Fundamentals
John Wiley and Sons, Inc. publisher

SCALE FACTOR EQUATIONS

$$K_R = \frac{(6.7\ cm^2)(20\ cm)}{(70.5\ cm^2)(1.9\ cm)(2.17\ watts/cm\text{-}deg\ C)(2.668 \times 10^{-6}\ ohm\text{-}cm)}$$

K_R = 1.715 X 10^5 deg C/watt-ohm

$$K_V = \frac{(25\ deg\ C - 5\ deg\ C)}{20\ volts} = 1\ deg\ C/volt$$

$$K_I = \frac{1\ deg\ C/volt}{1.715 \times 10^5\ deg\ C/watt\text{-}ohm} = 5.831 \times 10^{-6}\ watt\text{-}ohm/volt$$

NOTE: 1 amp = 1 volt/ohm

-or-

K_I = 5.831 X 10^{-6} watt/amp

ANALOG EQUATIONS

Q(watt) = (5.831 X 10^{-6} watt/amp)I(amp)

-or using milliamps(ma)

$$\boxed{Q(watt) = (5.831 \times 10^{-3}\ watt/ma)I(ma)}$$

ANALOG EQUATION TO USE IN LAB

CONCLUSIONS

Thus,by measuring the current, I, flow through the Test Block, we can calculate the heat flow, Q, through the Corner (Actual) Block.

By changing the variables and Test Block geometry, we can recalculate the analog equation and test any other heat flow we wish.

DATA TABLE 1

Voltage across Test Block(VOLTS)	Current through Test Block(MILLIAMPS)	Heat Flow (WATTS) K_1 X I
20		
5		
10		
15		
25		
30		

WRAP-UP

Now we have seen one method scientists and engineers use to find out what will happen to a particular device they have designed without having to build a full-scale, working model.

There are many ways to SIMULATE the operation of an actual device by measuring the effects on a much smaller and less expensive test device. Some of these ways are:

- -Wind tunnel testing of models of aircraft
- -Mockups to test the passenger comfort in a new automobile

A very modern way of simulation involves using computers to make numerous calculations of the various parameters of a device to determine how the device will perform under various operating conditions. In the future many people will be employed in these areas of Computer Aided Design (CAD) using computers to speed up the design process.

Can you think of any examples of using a simple test to determine the operation of another device?

TEACHING PATH - CLASS L1

(Students should have read this lab before proceeding, mostly to familiarize themselves with the nature of the lab to be completed and the equipment to be used.)

RESOURCE MATERIALS

Lab 5E1: "Electrical Energy Storage in Capacitors

CLASS GOALS

See **OBJECTIVES** for Lab 5E1.

CLASS ACTIVITIES

(Set up the lab. Run through the Procedures before students try the lab. You'll be able to anticipate student difficulties.)

1. Preview the lab for students. Explain what the lab is about. Show students the equipment. Tell students what they're to accomplish.
2. Have students follow the Procedures outlined in the lab carefully. (Reading detailed procedures and following instructions are important parts of a technician's training.)
3. Monitor student progress. Provide help as needed.
4. Ask students to read Lab 5E2, "Converting Fluid Energy to Electrical Energy," before doing the next lab.

Electrical Energy Storage in Capacitors

LAB OBJECTIVES

When you've finished this lab, you should be able to do the following:

1. Describe the construction of a capacitor.
2. Explain how a capacitor stores energy.
3. Calculate the charge on a capacitor, given its size and the voltage across it.
4. Calculate the instantaneous voltage across a capacitor in a resistor-capacitor (RC) network.
5. Calculate the approximate time required to fully charge a capacitor in an RC circuit

LEARNING PATH

1. Preview lab. This will give you an idea of what's ahead.
2. Read the lab. Give particular attention to the Lab Objectives.
3. Do lab, "Electrical Energy Storage in Capacitors."

MAIN IDEAS

1. Capacitors store and discharge electrical energy.
2. The amount of energy stored is determined by the size of the capacitor and the electrical potential across its terminals.
3. The rate of charge and discharge of the capacitor is determined by its size and the resistance of the charging or discharging path.
4. A large capacitor can store enough energy to briefly light a small lamp.

DISCUSSION

A simple capacitor consists of two conductive plates separated by a dielectric, or nonconductive material. Each of the plates is connected to a terminal of the capacitor. The dielectric may be air, teflon, paper, mica or a number of other insulating materials. When a voltage is applied across the two terminals, an electrical charge is deposited on the plates. The amount of charge that will be deposited for a given voltage is determined by the capacitance of the capacitor and is calculated using the equation

$Q = CV$ where Q is the charge measured in coulombs
C is capacitance in farads
V is volts

(1)

The capacitance is determined by the surface area of the plates, the distance between them, and the type of dielectric. While some capacitors are adjustable and have variable capacitance ratings, most have a fixed value. Although the formula above specifies capacitance in farads, most common capacitor values are in picofarads (trillionths of a farad), or microfarads (millionths of a farad). They are manufactured in many sizes and styles, with ratings from as small as a few picofarads to many thousand microfarads. They are also rated with respect to the amount of voltage which can exist between the terminals without the dielectric breaking down.

The amount of charge on the capacitor plates is related to the amount of current that flows into the capacitor. When the capacitor discharges, the direction of current flow reverses, in much the same manner as occurs with the charging and discharging of a battery.

If a power supply is connected directly to the capacitor terminals, the capacitor will charge almost instantly to the supply voltage. If, however, a resistor is placed in series with the capacitor, then the resistor will impede the flow of current and it will take longer for the capacitor to fully charge to the applied voltage. A resistor in series with a capacitor forms an RC circuit. Until the capacitor is fully charged, part of the applied voltage will appear across the capacitor and the rest will appear across the resistor.

By rearranging Eq.(1), it can also be seen that for a given charge, the voltage across a capacitor will vary inversely with the capacitance.

$$V = \frac{Q}{C} \qquad (2)$$

Therefore, if we know the charge on a capacitor and we know its capacitance value, we can calculate the voltage across it. Thus, the voltage across a capacitor in an RC circuit can be determined if we know the voltage applied to the circuit, the value of the resistor, the value of the capacitor, and the length of time that the capacitor has been charging through the resistor. The next equation summarizes these relationships.

$v = E(1 - e^{-t/RC})$

v = voltage across the capacitor
E = applied voltage
e = natural logarithm
t = charging time in seconds
R = series resistance in ohms
C = capacitance in farads

(3)

The exponential function ($e^{-t/RC}$) is of importance here. Note that when t= 0, the value of the function is 1. When this value is substituted back into Eq.(3), the voltage (v) across the capacitor is found to be zero.

$$\begin{aligned} v &= E(1 - 1) \\ &= E(0) \\ &= 0 \end{aligned}$$

This makes sense since t = 0 at the instant that the supply voltage is first applied to the circuit and, therefore, no charging time has elapsed.

At the other extreme, the voltage (v) across the capacitor can equal the supply voltage (E) only when the exponential function has the value zero.

$$\begin{aligned} v &= E(1 - 0) \\ &= E(1) \\ &= E \end{aligned}$$

But, for what value of (t) does the exponential function have a value of zero ?

$$e^{-t/RC} = 0 \qquad (4a)$$

$$\frac{1}{(e^{t/RC})} = 0 \qquad (4b)$$

$$e^{t/RC} = \frac{1}{0} \quad \text{but division by zero is undefined.} \qquad (4c)$$

Although the solution to Eq.(4c) is undefined, it should be noted in Eq.(4b) that as (t) increases, the exponential function $e^{t/RC}$ increases and, therefore, its reciprocal decreases. As (t) approaches infinity, the exponential function approaches infinity and its reciprocal does indeed approach zero. Thus, we can conclude that as time passes the voltage (v) across the capacitor approaches the supply voltage, but, in theory, never exactly reaches it. Since the resistance and capacitance values also affect the time required to charge the capacitor, it is convenient to think of the product (RC) as being a time constant. When (t) equals (RC), in seconds, we say that one time constant has elapsed. When (t) equals two times (RC), we say that two time constants have elapsed, and so forth. Note that in Eq.(4b), the base (e) is raised to the power (t/RC). Consider the following values for this equation:

Let $f(t) = \frac{1}{(e^{t/RC})}$

Then

when $t = RC$, $f(t) = 0.368$
$t = 2(RC)$ $f(t) = 0.135$
$t = 3(RC)$ $f(t) = 0.050$
$t = 4(RC)$ $f(t) = 0.018$
$t = 5(RC)$ $f(t) = 0.006$
$t = 6(RC)$ $f(t) = 0.002$

Our expectation is confirmed, that as (t) increases, Eq.(4b) approaches zero. Now, let's plug the above results back into Eq.(3).

$v = E(1 - e^{-t/RC})$

Then

when $t = RC$, $v = 0.632(E)$ or 63.2% of E
$t = 2(RC)$ $v = 0.865(E)$ or 86.5% of E
$t = 3(RC)$ $v = 0.950(E)$ or 95.0% of E
$t = 4(RC)$ $v = 0.982(E)$ or 98.2% of E
$t = 5(RC)$ $v = 0.993(E)$ or 99.3% of E
$t = 6(RC)$ $v = 0.998(E)$ or 99.8% of E

We see that (v) is in fact approaching (E).

Note also that the time required to fully charge is independent of the value of (E). In practice, it is convenient to say that the capacitor is fully charged after 5 time constants, because the voltage across the capacitor (v) has reached more than 99% of the applied voltage (E). This generalization simplifies the computation of charging time for any RC circuit.

Example

How long does it take to fully charge a 10 microfarad capacitor through a 1000 ohm resistor ?

Solution

The time constant for the RC circuit is (R x C) or

$1000 \times 10 \times 10^{-6}$ which is 10×10^{-3}

or

10 milliseconds.

The time required to fully charge is 5 time constants, or 50 milliseconds.

Laboratory

EQUIPMENT

5300 microfarad capacitor with a rating of 12 V. or greater
15000 microfarad capacitor with a rating of 12 V. or greater
1000 ohm resistor
12 V. lamp (100 milliamp (1.2 watt) or smaller)
Two switches (pushbutton, toggle, or slide)
Voltmeter
12 V. DC Power supply
Timer or watch with minutes and seconds indicator

Optional:

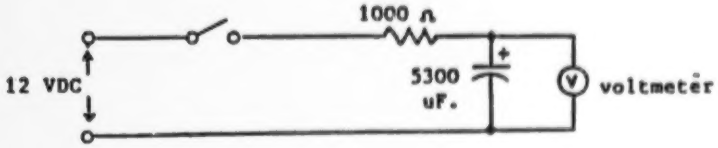
The accuracy of the results in this lab depends upon the accuracy of the capacitor and resistor values. The actual value of capacitors may differ by as much as 20% above or below the rated capacitance. Resistors may vary by as much as 10%. If the actual values of these components is not known, then it may be desirable to obtain a capacitor tester and an ohmmeter. Calculations should be done using the actual measured values. Otherwise, evaluation of the numerical results must take into account possible errors due to differences between rated and actual values.

PROCEDURE

```
*******************************************************
*                                                     *
* WARNING  ! ! ! ! ! ! ! !                            *
*                                                     *
*  Capacitors of the type required in this lab are    *
*  polarized.  This means that  the  terminals are    *
*  marked for proper connection to the positive and   *
*  negative leads of the power  supply. Reversing the *
*  terminals will result in improper readings and     *
*  MAY RESULT IN A VIOLENT RUPTURE OF THE CAPACITOR ! *
*                                                     *
*******************************************************
```

Part 1.

1. Construct the circuit shown in Figure 1 below, being careful to observe the polarity of the capacitor. Make certain that the switch is in the OFF position and that the power supply is also OFF.



2. Calculate the time constant (RC) for the circuit. Fill in all but the last column of the data table below.

# time constants	time in seconds	percent charge	capacitor voltage (% x E)	measured voltage
1		63%		
2		87%		
3		95%		
4		98%		
5		99%		

3. With the switch open, turn on the power supply. The voltage across the capacitor should read zero, because there is no path for charging current.

4. Close the switch and record the voltage across the capacitor after 1, 2, 3, 4 and 5 time constants in the last column of the data table.

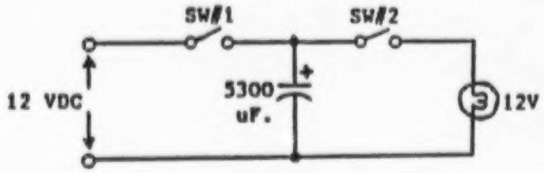
5. Compare your observations with the expected readings.

6. Repeat steps 1 through 5, substituting the 15000 microfarad capacitor for the 5300 microfarad.

# time constants	time in seconds	percent charge	capacitor voltage (% x E)	measured voltage
1		63%		
2		87%		
3		95%		
4		98%		
5		99%		

Part 2.

1. Construct the circuit below, making certain that both switches are OFF, as well as the power supply.



2. Close switch #1. Note that the capacitor is immediately charged to 12 volts.

3. Open switch #1 and immediately close switch #2. The lamp should light briefly as the energy stored in the capacitor is discharged. Note that the voltage across the capacitor has dropped to zero.

4. Repeat steps 1 through 3, substituting the 15000 microfarad capacitor for the 5300 microfarad.

5. Compare the brightness of the lamp for the two different capacitor values. It should be apparent that the higher value capacitor stores more energy.

TEACHING PATH - CLASS L1

RESOURCE MATERIALS

Lab 6T1: "Measuring Thermal Power"

CLASS GOALS

See OBJECTIVES for Lab 6T1

CLASS ACTIVITIES

(Set up the lab. Run through the Procedures before the students try the lab. You'll be able to anticipate student difficulties.

1. Preview the lab for the students. Explain what the lab is about.Show students the equipment.Tell students what they are to accomplish.
2. Have the students follow the Procedures outlined in the lab instructions. Encourage students to read the Procedures carefully. (Reading detailed procedures and following instructions are important parts of a technician's training.)
3. Monitor student progress. Provide help as needed.

BEST COPY AVAILABLE

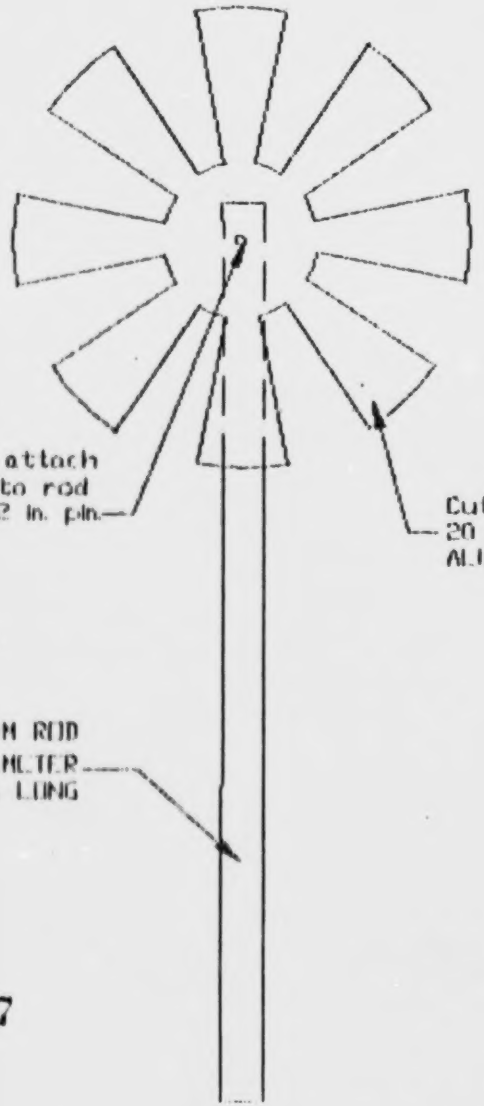
NOTE: The turbine can be built using the attached drawing "TURBINE ASSEMBLY DRAWING". The turbine diffuser can be built using the attached drawing "TURBINE DIFFUSER DRAWING". Students in the schools shop classes can make the turbine using aviation snips. The diffuser will require advanced sheet metal working skills and skills in Gas Tungsten Arc Welding (GTAW or TIG).
HINT: make photocopies of the "TURBINE TOP VIEW" and use the copy for a pattern by which to cut the sheet metal. None of the dimensions are critical. CAUTION: When working with sheet metals be careful not to be cut by the sharp edges.

To further study the operation of turbines, try bending the blades on several turbines to different angles to show the effect of blade angle on thermal power efficiency.

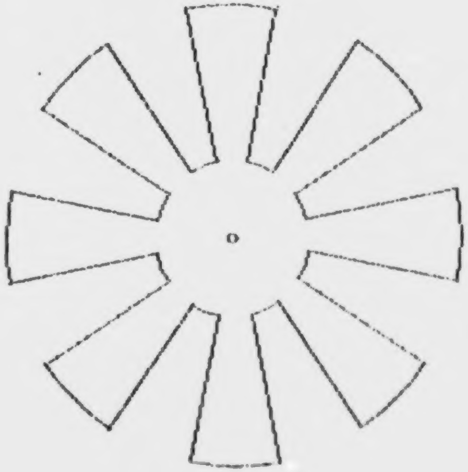
Any "turbine-like" device will work as long as it is not subject to deterioration by heat. Children's pinwheels will constitute a fire hazard.

If a Bunsen burner is not available consider substitutions such as: hurricane lamps, electric lamps with a globe having a 1.5 to 2 inch opening in the top.

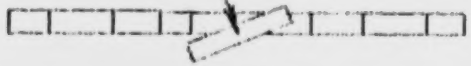
CAUTION:Follow standard safety procedures when working with a Bunsen burner.


Loosely attach
turbine to rod
with 1/32 in. pin.
Cut turbine from
20 gauge sheet of
ALUMINUM
ALUMINUM ROD
0.5 in. DIAMETER
5.5 in. LONG

ASSEMBLED TURBINE



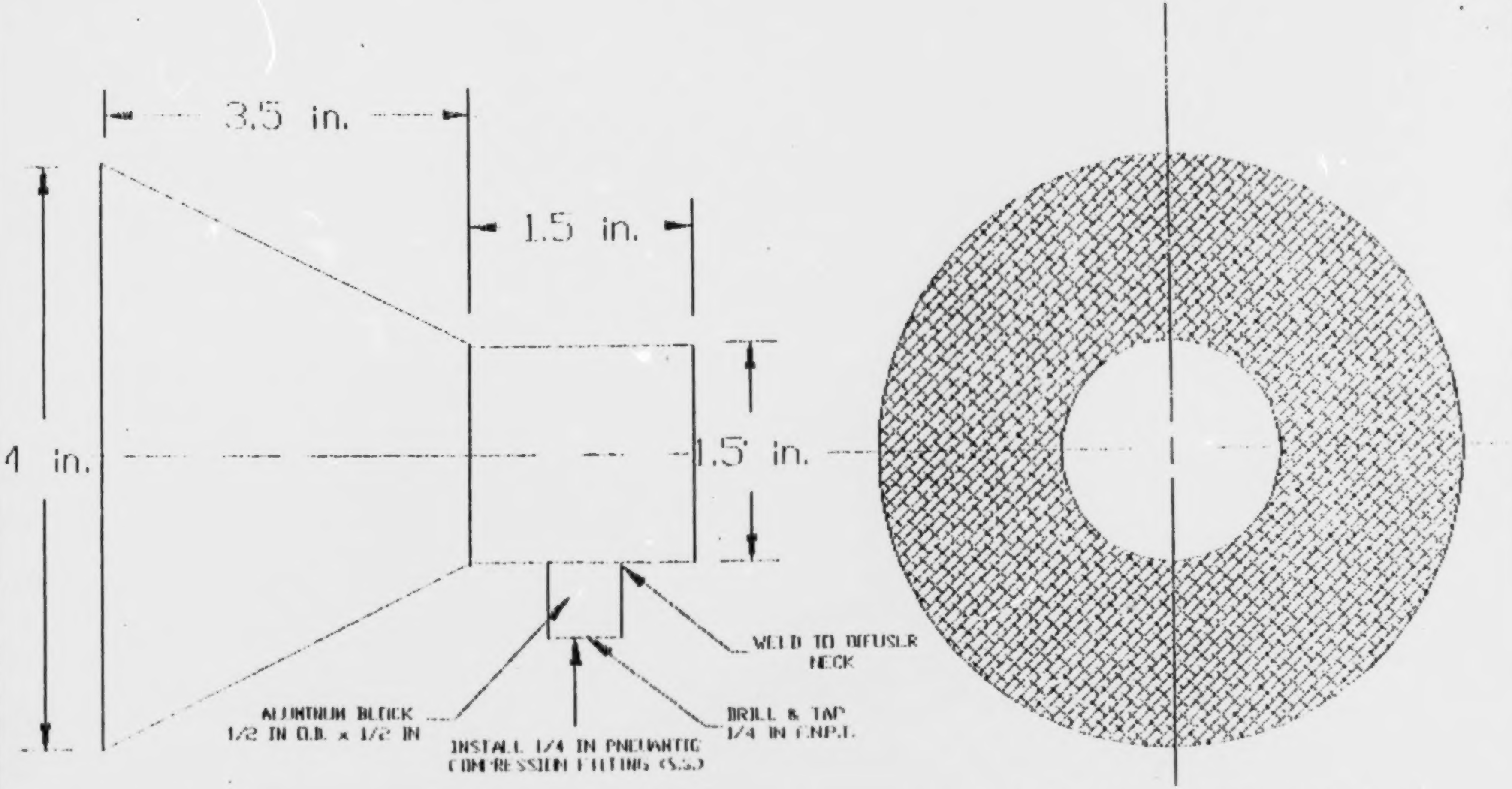
TURBINE TOP VIEW


Twist blade ends
15 to 30 degrees.
(Typical of 8)

TURBINE SIDE VIEW

Turbine Assembly Drawing

drawn J.L. Brown | date 1/12/90 | scale 1:1


3.5 in.
1.5 in.
4 in.
1.5 in.
WELD TO DIFUSER NECK
ALUMINUM BLOCK 1/2 IN O.D. x 1/2 IN
INSTALL 1/4 IN PNEUMATIC COMPRESSION FITTING (S.S.)
DRILL & TAP 1/4 IN F.NPT.

DIFFUSER SIDE VIEW

DIFFUSER TOP VIEW

NOTES:
1. Material 16 gauge aluminum
2. Weld and grind ALL seams
3. All exposed edges to be folded, welded and ground
to eliminate cutting hazard.

Turbine Diffuser Drawing

7.0

Drawn J.L. Brown | date 2/9/90 | FULL

MEASURING THERMAL POWER

LAB OBJECTIVE

When you've finished this lab, you should be able to explain the effect of thermal power input on a system's mechanical power output.

LEARNING PATH

1.Preview the lab. This will give you an idea of what's ahead.
2.Read the lab.Give particular attention to the Lab Objectives.
3.Do lab, "Measuring Thermal Power."

MAIN IDEA

.Turbines are used to convert thermal power into mechanical power.

DISCUSSION

A gas turbine is a device which extracts the thermal power from a gas stream and converts it into mechanical power. Gas turbines are used in industry to generate emergency electrical power. A gas turbine is the heart of the engines used to power jet aircraft.

HOW DOES A GAS TURBINE WORK?

Figure 1 shows the turbine used in a gas turbine. The turbine consists of a series of blades placed around the periphery of a wheel. The turbine wheel is attached to a shaft which turns with the turbine wheel.

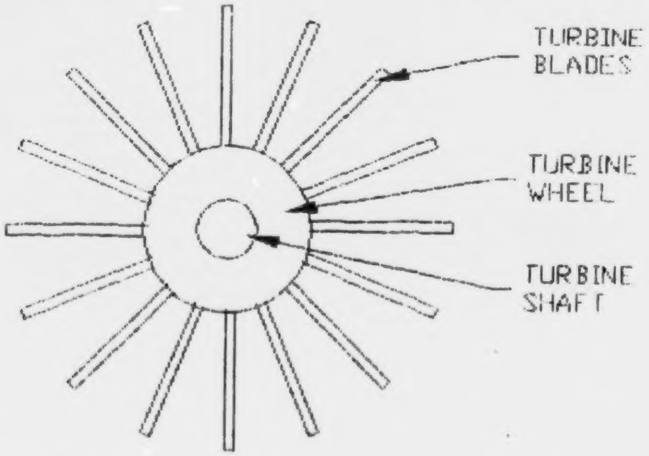


Fig. 1 Turbine Blades and Wheel

Figure 2 shows operation of a gas turbine. Hot gases passing over the turbine blades transfer power to the blades. The blades in turn move due to the power they receive. Since the blades are attached to the turbine wheel, they can only move so as to turn the wheel and its shaft. The rotating shaft then has mechanical power due to the thermal power imparted to it by the hot gases passing over the turbine blades.

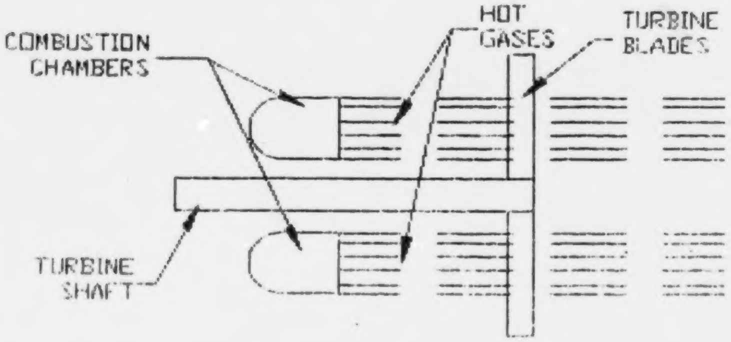


Fig. 2 Gas Turbine Operation

Figure 3 shows a single turbine blade with the force imparted to it by the hot gases passing over the blade.

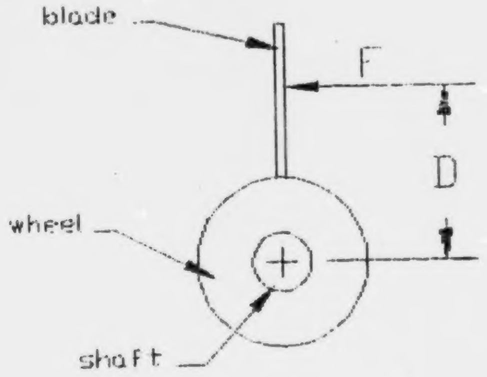


Fig. 3 Forces on a Turbine Blade

Since the force of the blades is at a distance from the center of the turbine shaft, the gases produce a torque on the shaft. The turbine shaft will turn at a certain speed so that the power imparted to the shaft by the hot gases can be determined from the formula:

POWER = TORQUE X SPEED

-or-

P = T X S

where P= power imparted to the shaft in watts

T= torque produced by the hot gas on ALL of the turbine blades in newton-meters or:

T = F X D

where F= force produced by the hot gases on ALL of the turbine blades in newtons

D= distance this force acts from the center of the turbine shaft in meters

S= speed of the turbine blades in revolutions per SECOND

APPLICATIONS FOR GAS TURBINES

Figure 4 shows the internal construction of a jet engine.

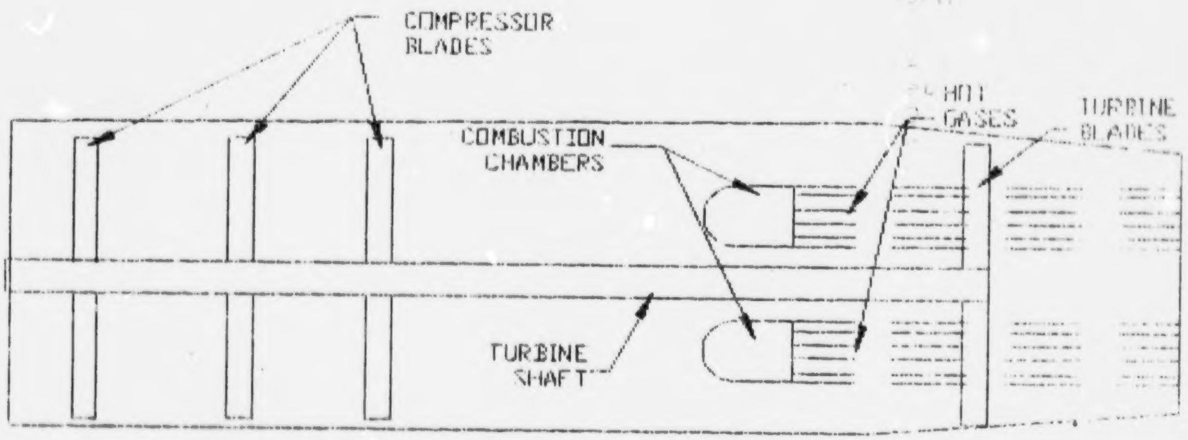

COMPRESSOR BLADES
HOT GASES
TURBINE BLADES
COMBUSTION CHAMBERS
TURBINE SHAFT

Fig. 4 Internal Construction of a Jet Engine

In the jet engine hot gases turn the turbines which then turn compressors which provide high pressure air which is used to burn the fuel to produce hot gases which drive the turbines. In some jet engines, other turbines turn fans which push more air through the engine and outside of the combustion chamber to increase the thrust (force of the exhaust gases) which then moves the airplane.

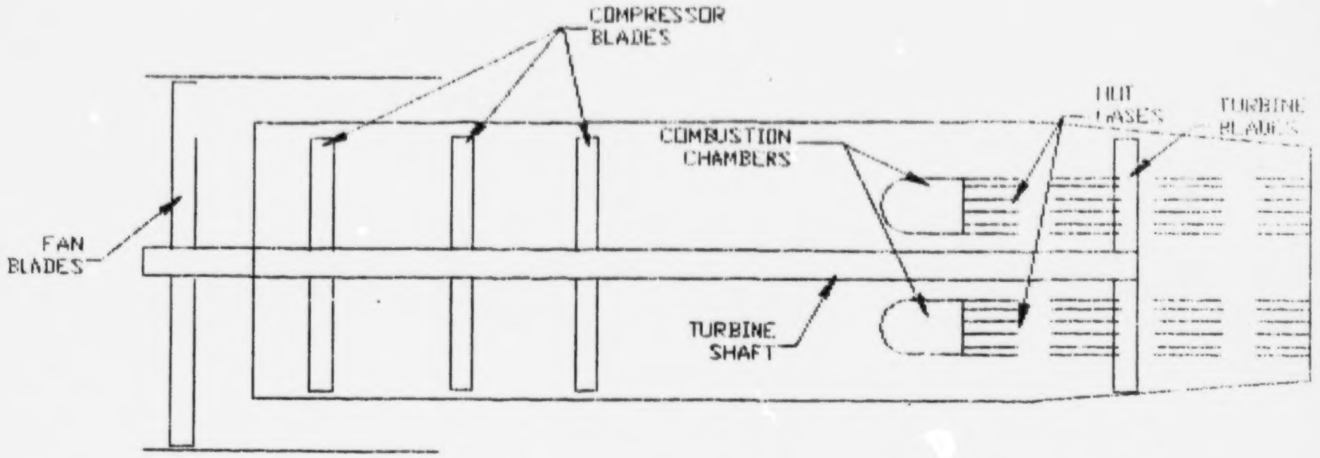

COMPRESSOR BLADES
HOT GASES
TURBINE BLADES
COMBUSTION CHAMBERS
FAN BLADES
TURBINE SHAFT

Fig. 5 Fans Added to a Jet Engine

The next time you hear a jet airplane fly overhead, remember that thermal power is the source of power which causes the airplane to fly.

Laboratory

EQUIPMENT

Bunsen Burner
Ring Stand
Clamps
Ring Clamp
Turbine
Turbine Diffuser
Thermocouple and multimeter
Stop watch or clock with a second hand

PROCEDURES

1. Mount the turbine and diffuser on the ring stand above the Bunsen burner.
2. Insert the thermometer into the compression fitting on the diffuser and tighten the nut enough to grip the thermometer but not enough to break the thermometer.
3. Light the Bunsen burner and turn it to its lowest intensity flame. [CAUTION: Do Not allow the flame to impinge on the turbine/diffuser to prevent damage to the turbine/diffuser]
4. Count the number of turbine revolutions per minute(RPM) and record this value and Gas Inlet Temperature from the thermometer in Data Table 1.
5. Turn the Bunsen burner to a slightly higher flame intensity and record the temperature/RPM readings in Data Table 1.
6. Repeat Step 4 until the Bunsen burner has been turned to its maximum flame intensity. (Try to obtain 10 test points)
7. Cut the Bunsen burner off and allow the turbine to cool before disassembling the apparatus.

DATA TABLE 1

Gas Inlet Temperature	Turbine RPM Reading

WRAP-UP

1. The turbine has a frictional resistance which the thermal power must overcome. This resistance means that the thermal power(P) must impart a torque(T) to the turbine to cause it to rotate at a certain speed(S). The formula which shows this effect is:

$$P = T \times S$$

2. Let's assume that the torque required to turn our turbine is constant. (This is approximately correct at the relatively slow speeds obtained in this lab exercise) Then, the ratio of the power developed of one test point to the power developed at another test point is:

$$\frac{P_1}{P_2} = \frac{S_1}{S_2}$$

where P_1 = Power developed at Test Point 1
S_1 = Turbine speed at Test Point 1
P_2 = Power developed at Test Point 2
S_2 = Turbine speed at Test Point 2

3. Now, by setting the Lowest Bunsen burner flame intensity as Test Point 2, we can calculate the power ratio between the other Test Points by calculating the Speed ratios between those same Test Points.

4. Using the turbine speed at the lowest Bunsen burner flame intensity as S_2, calculate the power ratios for all of the Test Points and tabulate this data in Data Table 2 below.

DATA TABLE 2

POINT	S_1 (RPM)	S_2 (RPM)	$P_1/P_2 = S_1/S_2$
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

5. How does the thermal power imparted to the turbine affect speed of the turbine? What can you infer about the mechanical power output at the turbine shaft? How is thermal power related to Gas Inlet Temperature?